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RESPONSE TO RAINFALL IN INDIA*

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Some effects of rainfall upon the life of man are apparent to the most casual observer. For instance, it is obvious that either through lack of rainfall, as in the Sahara Desert, or because of excessive rainfall, as in the Amazon Valley, the habitable areas of the earth are restricted or rendered exceedingly undesirable as places of human habitation. There are still other parts of the earth in which the precipitation, although more favorable for human habitation, compels man to adapt his life in many of its phases to its peculiar characteristics. The different provinces of India, presenting almost every possibility in the amount and yearly distribution of rainfall, furnish many interesting illustrations of the effects of the rainfall of a region upon the life of the people.

It is the purpose of the present treatment of the subject to note only a few of the more obvious responses of the life of the inhabitants of India to the peculiarities of rainfall of the several parts of the country.

It is necessary first to know something of the controls of the Indian rainfall in order that the distribution and variations of precipitation may be understood. For convenience of discussion, India may be divided into two parts: northern India, consisting largely of the plains of the Ganges and the Indus; and peninsular India, comprising all the rest of the country lying to the south of these plains. This area includes only the mainland as far east as Burma; it does not include Kashmir in the north, or Baluchistan in the west.

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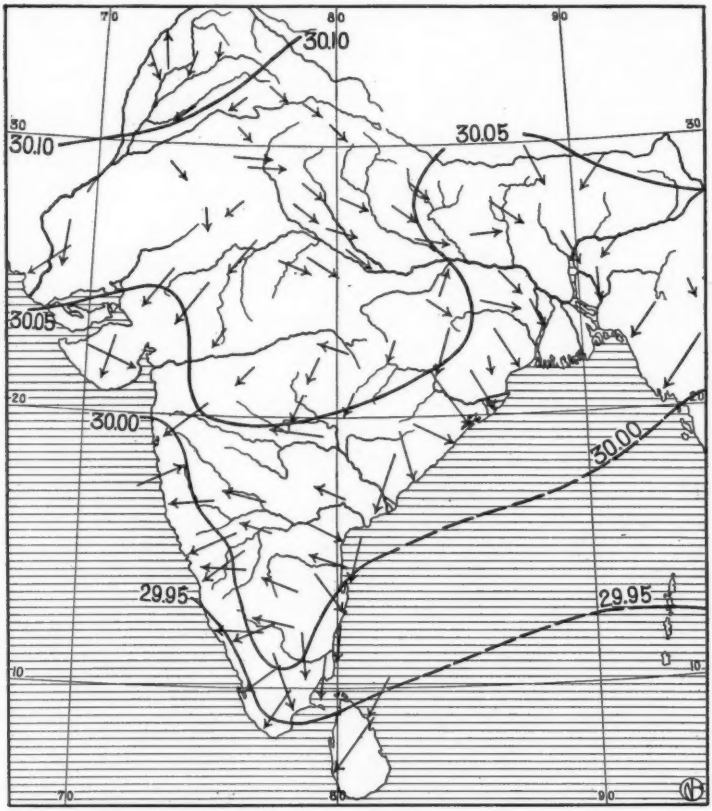
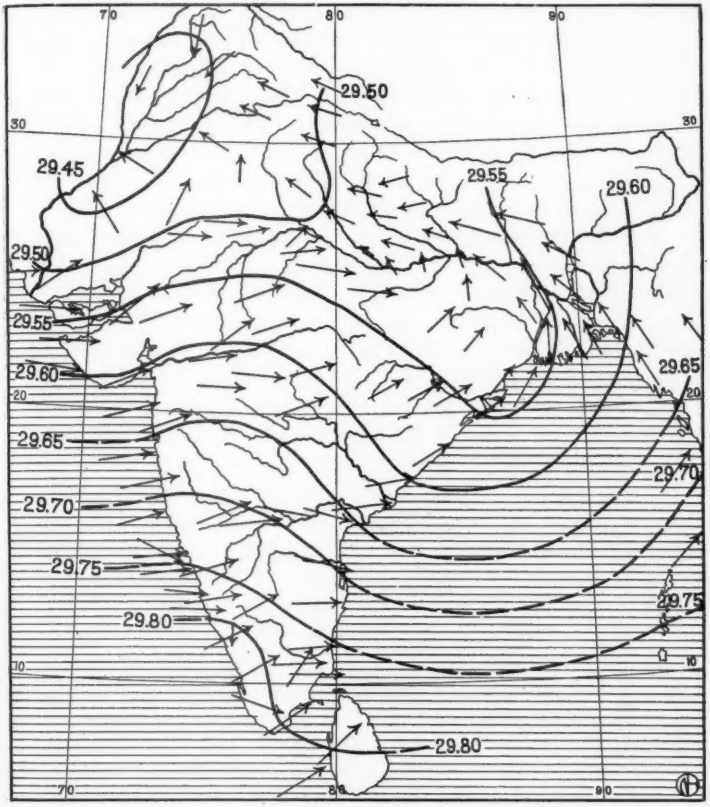
The rainfall of this region is, of course, due to the character of the winds, to cyclonic and other storms, and to peculiarities of topography. As the equatorial belt of low pressure, in its yearly migration, crosses India the deflected southeast trades blow across the country as the southwest monsoon during the summer, while



Average pressure and wind of India—January. (After Eliot.) Scale, 1:27,000,000.

during the winter the northeast trades are the prevailing winds and are known as the winter or northeast monsoon. Except in northern India, which receives precipitation from extra-tropical cyclones, the season of the winter monsoon, which blows from land to sea, is one in which little rain falls. Therefore a study

of the causes of rainfall in India consists very largely of an investigation of conditions prevailing during the summer monsoons. These blow over some part of India from the end of May, when they first appear over the southwest of the peninsula, to the middle of December when they retreat from the Carnatic. During



Average pressure and wind of India—July. (After Eliot.) Scale, 1:27,000,000.

their greatest northward advance these winds are divided by the Indian peninsula into two parts; one of these approaches the country from the southwest over the Arabian Sea, and the other from the southeast over the Bay of Bengal.

The controls of rainfall produce in much of northern India a

rainfall curve presenting two well-defined maxima. The winter maximum is due to the fact that all of northern India receives some rain from extra-tropical cyclones which appear in the western part of this region and move east along the Ganges valley, giving less and less precipitation as they advance. Some of these storms travel even as far as Burma, where they disappear. The total amount of rain from this source is small, in no case exceeding four inches for any one month. As one would expect, this rainfall also diminishes in quantity from north to south as distance from the highlands increases. Small quantities of rain, however, fall even in central India as these storms pass across country. Winter cyclones are also the chief source of the snowfall of the western Himalayas. The summer rainfall of this region, the cause of the second maximum of the curve, is brought by the southeast branch of the summer monsoon, which blows up the Ganges valley toward the area of lowest pressure in the extreme northwest of India. The distribution of rainfall over the area reached by this monsoon is determined by two causes: one, the distance from the sea from which the wind blows; the other, the elevation of the land. As results of these two influences, the rainfall is heavier in the eastern portion of northern India than in the western, and heavier near the Himalayas than on the plains farther south. Another source of rainfall in this region is the tropical cyclones which move from the Bay of Bengal to the west or northwest, frequently continuing as far as central India, and occasionally to the Punjab and Sind. The effect of the passage of such cyclones across the country is to draw the moisture-laden winds from considerable distances toward the center of the storm, thus increasing the rainfall of the region over which the storm passes. On the other hand, by interfering with the normal flow of winds of adjacent regions, these storms often produce "breaks in the rains" in those regions.

Adding the topography of the country to these controls of rainfall, *viz.*, the extra-tropical cyclones, the summer monsoons and the cyclones accompanying these monsoons, we have all the conditions necessary to explain the rainfall of northern India. The precipitation of Bengal and Assam, as shown by the rainfall map, is by far the heaviest of this part of the country, and at one place, Cherrapunji, is the heaviest in the world. The explanation of this fact is the nearness of these provinces to the sea from which the wind blows for a period of four months or more with little interruption. Moreover, that portion of the Bay of Bengal which

is nearest this region is the one from which the tropical cyclones most frequently advance upon the land, hence this area receives more rain from this source than any other part of India. The heaviest rainfall, that of Cherrapunji, occurs on the windward side of the Khasi Hills where the warm, moisture-laden winds are forced up at a distance of not more than 200 miles from the sea. The fact that the altitude of Cherrapunji is about that of the zone of maximum rainfall is another reason for the exceptionally heavy precipitation of that place.

In order to be understood, the exceedingly light rainfall of parts of Rajputana and Sind requires more careful explanation. In addition to their great distance from the Bay of Bengal, the slight elevation of the region, which varies from 49 feet above sea level at Karáchi to 420 feet at Multan, is a determining factor, as well as the temperature, which during the season of summer monsoons is very high. Again, in summer this is the region of the trough of low pressure about which the winds move in a counter-clockwise direction. In consequence, the winds blowing over portions of this province, particularly the plains of Sind and western Rajputana, have their origin in part at least over the lands to the west and therefore carry little moisture. The winds coming from the sea are deflected to the east of the low-pressure area, and do not ascend until they reach the highlands to the north.

Much the same factors as control the distribution of rainfall in northern India are responsible for the varying amounts of precipitation in the northern part of peninsular India, with the exception that the latter region receives rain from both branches of the summer monsoon. Throughout the greater part of the rainy season the winds of these provinces are west winds blowing from the Arabian Sea. However, the wind and rainfall charts present an interesting problem, for, notwithstanding the direction of the wind, the annual fall of rain increases from west to east. For one cause of this distribution we may turn to the tropical cyclones which almost invariably move over the land from east to west, the precipitation diminishing as the distance from the Bay of Bengal increases. Another factor is the behavior of the two branches of the monsoons as the close of the rainy season approaches. The southwest branch often retreats toward the south first, and, as it withdraws, an indraught seems to be formed, so that its place is taken by the southeast winds from the Bay of Bengal. Consequently, while this latter wind blows, the rainfall of the region will diminish from east to west.

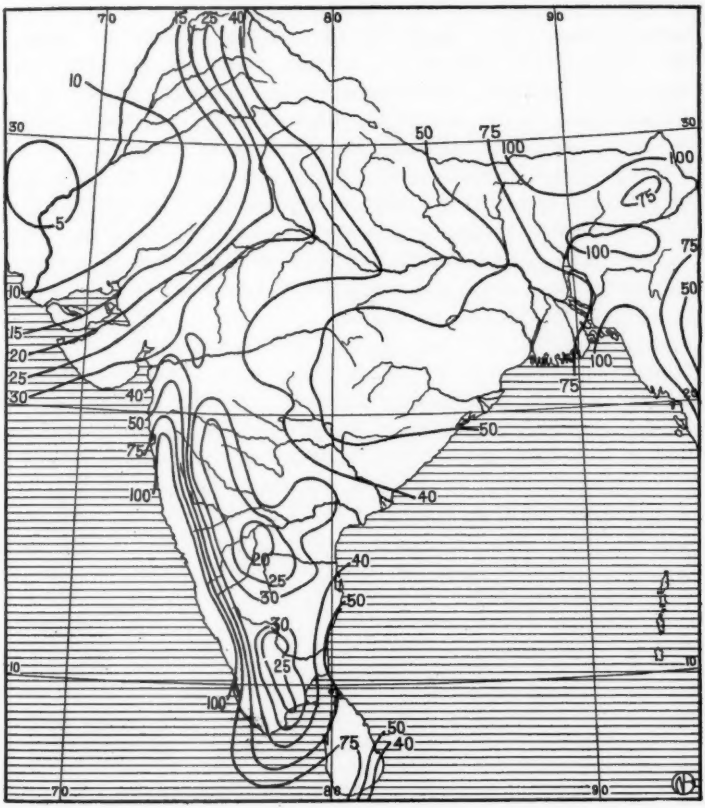
There remains to be considered the rainfall of the southern part of peninsular India, which differs from that of the other areas discussed in that the precipitation diminishes toward the interior from both the eastern and western coasts. This condition is readily understood on the western side where the Western Ghats intercept the southwest branch of the monsoons, causing very heavy rainfall on the western side of these highlands and leaving a correspondingly small supply for the area to the east of the mountains. As for the eastern side of the peninsula, the cyclones again help to explain the decrease from east to west. But the condition is accounted for to a much greater extent by the change in the direction of the summer monsoons as they retreat southward across the Bay of Bengal from the middle of September to the middle of December. During the early part of the summer the winds over the southern part of the bay blow from the south, but later, as in the case of central India, and to a greater extent than in those provinces, the winds are deflected toward the land, thus giving the southeastern portion of the peninsula, at that time, its heaviest rains for the year.

To understand the effects of India's rainfall, the average annual precipitation for the different provinces, as well as the variation in amounts for the several regions from year to year, must be known. The amount of rainfall within the year is often not so important as the distribution of that amount throughout the year.

H. F. Blanford showed that in India, as in other countries, rainfall varies most from year to year where it is smallest in amount, and that the supply is most constant where the fall is greatest. To explain variations in annual supply several reasons may be given. The number and intensity of the cyclones passing over the country may vary considerably from year to year, and thus one cause of variation is seen. The rains also may begin later than usual, or they may terminate earlier than in the normal season, or they may be reduced both by late beginning and by early retreat. Even with a normal advance and retreat of the monsoon there may occur "breaks in the rains," periods lasting perhaps for weeks, during which little or no rain falls, or there may be scanty fall for a part or the whole of the season. The factors of variation from year to year also suggest the reasons for differences in distribution throughout the year. For example, the times of advance and of retreat and the number and duration of the breaks in the monsoon, all play an important part in yearly distribution. The number, the intensity, and the time of the occur-

rence of winter and summer storms also exert an important influence on the annual distribution.

The life of man in India shows many responses both to the total amount of rainfall and to its distribution throughout the year. While there are many cases showing the immediate effect of dif-



Mean annual rainfall of India in inches. (After Eliot.) Scale, 1:27,000,000.

ferences in rainfall, there are a few showing the effect of long-continued influences upon the people. A good illustration is shown in the differing characteristics of the people of northern India. In parts of the Punjab and the adjacent provinces of northwest India the precipitation is slight. Constant struggle for

existence means the survival of the fittest and the consequent production of a hardy type of people. On the other hand, on the hot, damp rice fields of the Ganges delta the bountiful harvests make life easy. The weak are not eliminated as they are on the arid plains of the west. This region is occupied by a less hardy and less energetic people.

One proof of the difference in types of peoples in the two regions mentioned is shown by the outcome of conflicts between them and neighboring tribes. The population of the lower portions of the western Himalayas shows the effects of a marked intermixture with the people of the adjacent plains. This condition indicates successful raids by the hardy plains people into the country of their neighbors of the mountains, while there is little evidence of encroachment of mountaineers upon the plains. The weaker tribes of Bengal and Assam have been less fortunate. Here we find the Mongoloids of the mountains pressing to the very borders of the plains, with no proof of movement into the mountain region by the plains people.

Doubtless the effect of rainfall is shown more clearly in its relation to agriculture than in any other way. The kinds of crops which can be successfully produced in any locality must be selected on the basis of the amount of water needed by the crop. While it is evident that influences other than rainfall, such as temperature, irrigation, and character of soil, may aid in determining the crops raised, yet these other factors do not prevent one from tracing the direct effects of rainfall. The crops which require much rainfall or liberal irrigation for their successful cultivation are rice, jute, tea, or coffee. In regions in which the rainfall is heaviest as in Bengal, Assam, and the low valleys of the Western Ghats, rice is by far the most important crop. Sugar-cane is also grown in these wet provinces, but the areas given both to sugar and rice are, of course, not limited to regions in which rainfall alone gives sufficient moisture. The areas are constantly extended into regions in which rainfall is supplemented by irrigation, and even into regions like Sind, in which agriculture is wholly dependent upon irrigation. In regions in which rice is wholly dependent upon rainfall, it needs heavy rains at time of planting, frequent, moderate rains during growth, and a burst of rain in late stages to insure development of the grains. The rains of the later stages of growth are most important of all. For this reason, too early withdrawal of the monsoon rains has serious effect upon the rice crop. Rice growing is made possible in parts of the Central Prov-

inces because of the relatively large number of storms passing over this part of the country during the period of the summer monsoon. These regions lie in the low pressure trough between the southeast and southwest branches of the monsoon. Cyclonic storms exhibit a marked tendency to move along this trough of low pressure and variable winds. In some parts of the interior the rainfall of the wet monsoon occurs only during the passage of cyclones. There are many varieties of rice, and it is necessary that the planter know the conditions of rainfall, the character of the soil and the methods of cultivation to which each is best adapted. In parts of Bengal and Assam, which are more or less inundated at times of heavy rain, a variety of rice has been developed which lengthens its stalk as the water rises and is said to be able to keep the heads above eight or ten feet of water. It is often harvested from boats before the water subsides. Rice is commonly planted after the first heavy rains. Sugar differs from rice in time of planting, and indeed, from most other crops of India, in that the planting time is adapted to temperatures instead of to rainfall. It is planted in February or March before the hot season, as the young plants suffer from the hot sun.

The other crops requiring much moisture, *viz.*, jute, tea and coffee, differ from sugar and rice, in that their areas are not extended by irrigation but are limited to those regions in which water is supplied wholly by rainfall. The cultivation of tea requires not only a rather heavy rainfall but an atmosphere which is moist throughout the growing season. Dry winds are injurious. For this reason tea raising has not proved profitable in Chota-Nagpore, as the plants are injured by the dry winds of spring. The only provinces which are important for the growing of tea are Bengal and Assam, where the rains begin early, continue late in the season, and as a rule have few "breaks" or interruptions during the summer season. Coffee is grown chiefly in the hills of western Mysore and Coorg. The hills not only give the necessary elevation to which coffee is adapted, but they also intercept the moisture-laden winds of the southwest monsoon and thus supply the necessary precipitation. Incidentally, they also supply good drainage, an important feature, since flat and wet lands are not suited to coffee. Jute is a crop important only in Bengal. Conditions necessary for its cultivation are essentially the same as those for rice. The plant is, however, grown on rather high land, where there is sufficient rainfall during the whole period of growth. As it is a

crop which exhausts the soil, it is confined largely to regions in which inundation supplies regularly a new layer of silt.

Crops requiring less water are wheat, millets, pulses, and cotton. Wheat and cotton are injured by heavy rains, especially during later stages of growth. For this reason cotton, although a summer crop, is limited to those provinces having a comparatively light rainfall, as in parts of northern India and in the northern and central parts of peninsular India. In the latter region, it is grown chiefly on the black "cotton soil," which is very retentive of moisture, so that a satisfactory crop can be raised even where the rainfall is very light. Cotton is always a summer crop and is planted after the first rains. In peninsular India the crop in general is wholly dependent upon rainfall. Hence, failure of rains may mean loss of the entire crop. Unlike cotton, wheat is invariably grown in winter, a season in which the rainfall is less than that of summer, although in the central and western parts of northern India it is not the season of least rainfall. Irrigated wheat is grown in largest quantities in the Punjab, Rajputana, and the United Provinces, the water being obtained from canals and wells. When "dry crop" or unirrigated wheat is grown in these provinces it depends upon the moisture remaining in the ground at the end of the summer monsoon, and also upon the precipitation of the winter cyclones which are necessary for a full crop. In central India and the Central Provinces, where the winter rainfall is less than in northern India and where there is much less opportunity for irrigation, "dry" crop wheat is extensively grown on the moisture-holding black soil. Excellent crops are raised if the late summer rains are favorable. As wheat does best in cool climates, it is grown hardly at all south of the Central Provinces.

Except on the best-watered plains suitable for rice growing and in the important wheat-growing districts of northern India, the millets and pulses form the bulk of the food of the agricultural population. In regions in which rice is grown on the low lands as a "wet" crop, millet is usually grown on the higher lands as a "dry" crop. Hot weather millets require a heavy burst of rain at planting time, then frequent moderate rains for growth. Prolonged "breaks" in the rains for three weeks or more, accompanied by dry winds, affect the crop seriously. Of the pulses, some varieties are grown either as summer or winter crops, while others are grown only in the winter. Of the latter, the area sown varies with the character of the late rains. The chickpea is always a winter

crop. It is largely grown on the black soil as a "dry" crop, but in the north it is irrigated in regions of light rainfall or in particularly dry seasons. The pulses are often sown with wheat or other grains, so that in case of an unfavorable season, a harvest may be obtained from one sowing if not from the other. The size of the harvest, in case of the winter-grown pulse, is greatly influenced by the amount of winter rainfall, particularly in January.

Before deciding upon the particular crop to be raised, the Indian planter must take fully into account the amount and distribution of the rainfall of his locality and the relation which such rainfall bears to kinds of soil and to possibilities of irrigation. Not less carefully must he study the character of the precipitation in order to decide upon the number of crops per year, the rotation of crops, the times of planting and of harvest, and also the methods of cultivation. Two crops a year are raised in many parts of India, although in many cases the poor soils, combined with primitive methods of cultivation, do not permit two crops to be raised upon the same land in a given year. On the other hand, in such a province as Bengal, where rain falls throughout the greater part of the year and the land is constantly enriched by depositions of silt, two and and sometimes three crops are grown on the same tract of land in one year. In most parts of the country the rainfall, in favorable seasons, is well adapted for two crops per year. The summer or autumn crops, as they are called, are sown in June or as soon as the ground has been softened by the monsoon rains. These, of course, depend for their moisture wholly upon the summer precipitation, while the autumn planting depends upon moisture remaining from summer rains and upon the rainfall of winter. In most parts of the country the winter rainfall, while very necessary for successful harvests, is small in quantity.

In central India, the double-cropped area varies according as the autumn rains are much or little. Seeds of the second crop are often sown in wet rice fields just as it is ready for the harvest. Even when the summer crops fail, autumn rains, supplemented by winter showers, make successful harvests possible for the latter season. In Bengal and Assam considerable rain falls from March to May, hence sowings may be made earlier than in other provinces depending upon rainfall. Much of the Bombay Presidency and the plains of the northwest receive no rain during the months of March, April and May, which are known as the hot season. In the plains of the Punjab, particularly, the intense heat and dryness of these months reduce the country to desert

conditions. Consequently agricultural pursuits are at a standstill during this period.

For the reason that rainfall is always scanty in certain parts of India, and that nearly all parts are subject to seasons of light rain, or of unsatisfactory distribution of rainfall, irrigation systems have been developed throughout the country. The regions receiving heavy rainfall, and consequently those in which chances of failure are remote, are Bengal and Assam and the strip of territory west of the Western Ghats. In other portions of India large areas would, without irrigation, be permanently waste, or could be cultivated only in years of exceptionally favorable rainfall. In still other regions having rainfall ordinarily sufficient, irrigation serves as security against seasons in which the rains fail in greater or less degree. When monsoon rains fail for one or two seasons in succession, agriculture in "dry" lands fails, while abundant harvests may be raised on irrigated areas. In times of scanty rainfall the limit between famine and plenty is the line between irrigated and non-irrigated lands.

Owing to differences in soil and topography, as well as to inequalities of rainfall, the character and extent of irrigation differs greatly in the several provinces. Irrigation by means of canals is not feasible if the rivers run in deep channels through the region which it is desired to water, or if the area has marked inequalities of surface, since the water in general is distributed by natural flow. For these reasons we find the largest canal projects in the plains of northern India and on the deltas of the east coast of the peninsula.

In northern India agriculture can be carried on in the province of Sind only where irrigation is possible. The Indus is to Sind what the Nile is to Egypt. Beyond the limits of irrigation all is a stony, sandy waste. Water is taken from the river by means of canals. No canal has its head where the river bank is really permanent, therefore the river must rise several feet before the canals can be filled. Many of the canals are former tributaries of the river which have been reopened and extended. Such simple methods of irrigation, however, make possible the cultivation of more than 2,000,000 acres of land, and thus enable this desert province to support a population of several millions.

East of Sind, in the Punjab and the United Provinces, while agriculture is by no means wholly dependent upon irrigation, the rainfall is so precarious that canal irrigation is necessary to prevent crop failures and consequent famine. Here are found

some of the largest government projects, such as the Bari Doab Canal, the East and West Jumna Canals, and the Ganges Canal. Some idea of the size of these undertakings is indicated by the fact that the entire volume of the Ganges at Hardwar, where it issues from the hills, is diverted into a canal and distributed to the level tracts of the United Provinces. Twenty miles farther down, the entire volume of the river is again diverted to irrigation channels. Some of the larger canals are from 150 to more than 300 miles in length. Irrigation works of large proportions are possible in this part of the country because of the comparatively level land, and, what is more important, because of the large snow-fed streams issuing from the Himalayas. In these provinces more than 2,000,000 acres are irrigated by government projects. In addition to these canals, water is also obtained from wells, particularly in the north near the Himalayas, and from inundation canals on the southern plains. On areas not reached by irrigation, "dry" crops are raised; these necessarily fluctuate with the amount and distribution of rainfall.

The only other portions of India in which canal irrigation is carried on extensively are the deltas of the east coast of the peninsula. The chief rivers entering the sea on the eastern side of the peninsula are the Mahanadi, the Godavari, the Kistna, and the Cauvery. In the upper part of their courses these rivers run in deep channels and so drain the land instead of irrigating it, but as they enter upon the plains of the coast, dams are thrown across them, thus permitting the water to be diverted to extensive irrigation works. The deltas of these rivers are covered with crops which, because of the excellent system of irrigation, almost never fail.

While irrigation by means of canals is necessarily limited to the few areas in which conditions are favorable, irrigation by means of tanks or storage-works is to be found in all provinces except Sind and the Punjab. Canal irrigation is adapted particularly to those areas in which the river flow is fairly constant for the whole or the greater part of the year, as south of the Himalayas, where the rivers are supplied by the melting snows of the mountains. On the other hand, tanks are used where the drainage flow is intermittent or varies greatly in quantity, as in many of the smaller streams of peninsular India. These tanks, which are formed by damming the streams, vary in size, from lakes in which are impounded several billions of gallons to the small tank which supplies only a few acres. However, the area

supplied by large tanks is small as compared with the total area supplied by the many smaller tanks constructed chiefly by the owners or tenants of the lands with little assistance from the government. Water is supplied by thousands of these smaller tanks in Madras, where they are found to a much greater extent than in any other part of India. Other regions of irrigation by storage tanks are the Gujarat and Carnatic Districts of the Bombay Presidency, the Deccan, and the Central Provinces. In the latter provinces the tanks are nearly all small private reservoirs, although in the aggregate they supply about 500,000 acres. Generally speaking, the broken character of the surface of practically the whole of peninsular India offers little facility for canal irrigation. It is better adapted to irrigation in small regions of variable extent by wells, tanks, and small streams.

The other method of irrigation, which has already been referred to, is by means of wells. This type differs from the types previously described, in that the works are always on a very small scale and irrigate areas varying in size from one to twenty acres. In the aggregate more than thirty per cent. of the irrigated land of India is watered in this way. Seventy per cent. of the land thus irrigated is in the Punjab and the United Provinces, where the alluvial plains offer the most favorable conditions for well irrigation. Wells are also found in the Madras and Bombay Presidencies. In the Central Provinces, where the rainfall is slight, ground water is found only at great depths, thus making well irrigation impracticable. In certain parts of India the well water contains nitrates. In parts of Gujarat large crops of tobacco are raised year after year with no fertilization of the soil except that obtained from nitrates in the irrigation water. In the cattle-raising districts of Rajputana water from wells is practically the only source of supply. Well irrigation becomes increasingly difficult as depth of ground water becomes greater, first, because of increased cost of constructing the well, and, second, because of the cost of operation. In nearly all cases in which the well water is not near the surface the operating cost by this method is greater than that by canals and tanks, because, by the latter methods, water is distributed by natural flow.

Irrigation not only greatly increases the area given to agriculture, but it renders more secure against precarious rainfall the crops of a large proportion of the country. Indeed, irrigation is regarded as a form of insurance against famine. From earliest times India has suffered from famines, the area varying with the

extent of failure of the rains. The regions most likely to have famines are the western and southern districts of the United Provinces, the Punjab south and east of the Sutlej, eastern Rajputana, and the larger portion of peninsular India south of the Central Provinces and east of the Western Ghats.

In northwest India failure may be due to one or more of the causes which prevail over a great part of the country, such as late beginning or early termination of the monsoon rains, "breaks" in the rains, or scanty fall for greater or less portions of the monsoon period. One cause of "breaks" is the displacement northward of the axis of low pressure lying between the southeast and southwest branches of the summer monsoons. This movement diverts the southeast monsoon winds from their usual course and allows their place to be taken by hot, dry winds from the arid plains to the northwest. Famine is almost sure to occur in northern India if, in addition to loss of summer rainfall, there is also failure of winter rains upon which the planter depends for the success of his spring or winter crops. With the assistance of October rains, which moisten the earth for sowing cold weather crops, two bumper harvests have been obtained from an annual rainfall aggregating only one-third the average. Such a case is a good illustration of the importance of the favorable distribution of rainfall throughout the year.

In central India and the Central Provinces complete failure of the rains almost never occurs. Famine is usually due to several indifferent years followed by one in which rainfall is very slight. In the black soil region of the western districts famine is almost wholly unknown owing to the ability of the soil to retain moisture. In the great famine of 1899-1900 the suffering would have been much less had not the dry season included the critical weeks of late summer. If rainfall up to the end of October is sufficient, the success of both crops is assured, although showers in November and December are necessary to produce heavy spring crops. During the famine of 1900 the inhabitants of Malwa, one of the provinces of the black soil region, were wholly unprepared, the people then living never having experienced famine. Inhabitants of regions subject to famine often migrate to provinces where food can be obtained. Conditions at this time in Malwa were rendered much worse by an influx of people from Rajputana, who, in previous famines, had obtained food in Malwa.

The eastern part of peninsular India receives rainfall both from the southwest branch and from the retreating southeast branch

of the summer monsoon. Therefore crops in these regions, depending for their water supply upon rainfall, suffer from failure of either of these rains. Obviously, conditions are most serious when both rains fail. The Orissa famine of 1866 was due to very early termination of the ordinary southwest monsoon in 1865, and to the failure of the retreating monsoon the same year. The Madras famine of 1833 was due to a partial failure of the southwest monsoon followed by complete failure of the retreating monsoon. Similar conditions were the causes of famine in 1854 in Bellari, Madras and Hyderabad, except that in the preceding year the rainfall was exceptionally heavy and the crops unsatisfactory. On the Plateau of Deccan the people hardly expect more than two good crops in five. Here famine is due to one or more bad seasons followed by complete failure of the southwest monsoons. The irrigated crops of Madras as well as the dry crops are dependent upon the retreating monsoons. The planter depends very largely upon these rains to fill the irrigation tanks. Hence failure of the retreating monsoon rains may result in loss even of irrigated crops, and famine follows.

In former times, famines and scarcity were more frequent and widespread than in recent years. It is only since the country has been controlled by Great Britain that the larger irrigation works have been developed, particularly the large canal projects of northern India. Another reason for the greater suffering of earlier times was the lack of means of communication between afflicted provinces and those in which food might be obtained. In addition to an increase in the area of irrigated lands, scarcity and famine are now much more readily relieved by the multiplication of railroad lines constructed by the British. To-day, when crop failure occurs in a province, the consequent rise in prices diverts to that region products of other provinces which otherwise might be exported to foreign countries.

While crop failure may be prevented in considerable degree by irrigation, and while the effects of such failures may be relieved by increased transportation facilities and government aid, yet the real cause of famine, the failure of the rains, cannot be controlled by man. As the very life of the people depends upon the precarious rainfall of large areas of India, the government has established and maintained one of the best meteorological services in the world. In order that rainfall conditions may be anticipated as far as possible, the service attempts to forecast the character of the summer monsoon and its rainfall. Some of the data used

as the basis of this forecast are the amount of snowfall in the Himalayas during the preceding winter, the strength of the southeast trades before crossing the equator, the character of the rainfall in the southeast trade region in the southern hemisphere, and the pressure conditions in the different provinces. It has been found that heavy and late snowfall in the Himalayas is likely to be followed by a late summer monsoon, giving scanty rainfall, particularly on the Bombay side of the peninsula. This method has been used successfully in forecasting failure of the rains. It has also been found that there is a close relation between the rainfall in the southeast trade region in the period November to April and the rainfall of the Arabian branch of the Indian monsoon. That is, a light rainfall in the southeast trade region is either preceded or followed by a weak monsoon in India. In such years the southwest branch advances late, retreats early, and gives less rain than usual over the whole area dependent upon it. The distribution over India of the precipitation of any monsoon is predicted on the basis of the pressure conditions existing in the different provinces for some time preceding the advance of the monsoon. The wind currents are directed particularly to those areas in which the pressure has been persistently low, and are diverted from those areas in which the pressure has been persistently high. What is still more important, these differences in pressure, once established, are likely to be maintained throughout the summer monsoon period, and are therefore one of the most important elements in making possible a forecast for the different parts of the country. The forecasting of the character and rainfall of the summer monsoons in India is particularly interesting, in that it furnishes the only instance in which long-range seasonal forecasts have been at all successful.

In the discussion of agriculture the want of closer relation between rainfall and products was explained as being due to the presence of other influences such as character of soil and irrigation projects. The same statement could be made with reference to the effect of the rainfall of the several portions of the country upon the distribution of population. Notwithstanding the presence of these other causes, a glance at the population maps shows the greatest density where rainfall is heaviest and therefore most reliable, and least density where rainfall is lightest and most precarious. It is easy to see that sufficient and dependable rainfall, making good harvests possible every year, would naturally lead to denser population than a scanty and irregular rainfall, permitting

harvests only of moderate size in ordinary years, and meagre crops, or none, when the rains fail. But in addition to this direct relation between rainfall and population there are other less apparent but equally effective ways in which the number of people is influenced by the amount and distribution of rainfall. For example, in addition to an increased death rate, failure of crops also produces a noticeable reduction in the birth rate due in part to the smaller number of marriages at such a time. The marriage ceremony involves great expenditure: crops are necessary in order that the money be obtained. Consequently, with failure of the crops, marriages are deferred, and the able-bodied men go to other places in search of work. With recurrence of good harvests the people return, deferred marriages are celebrated, and the increase in population is soon apparent. Moreover, the supply of food has direct effect upon the health and in consequence upon the birth rate as well as upon the death rate. A marked increase in the cost of food, following crop failure, causes an immediate increase in the death rate, and a decrease in the birth rate nine months later. Any considerable reduction in the cost of food produces the opposite effect. Even in the normal season, the birth rate and death rate fluctuate with varying food supply. In general, if the principal harvest is gathered in October there is a sudden rise in the birth rate the following July, increasing to a maximum in September or October. From this time there is a gradual fall in the birth rate to the minimum in June. Where the chief crop is harvested in December, the rise in the birth rate occurs at a correspondingly later period. On irrigated lands, where crops are secure, the birth rate is uniformly high.

The large number of deaths occurring at times of scarcity or famine, while due in part to actual want of food, is probably due in greater measure to the prevalence of disease among the people, which their weakened bodies are unable to resist. Moreover, the peculiar conditions incident to abrupt changes in the rainfall are particularly favorable to the spread of certain types of diseases. The effect of heavy and continuous rains is to wash accumulated soil impurities into the water sources and to leave stagnant collections of water where drainage is defective. Wells fill too rapidly for the water to be purified as it passes through the soil, hence it is unfit for drinking purposes. The change from dry season to wet is accompanied by an abrupt change in the food supply, coarse vegetables taking the place of the dry grains. Where there is rice cultivation the natural drainage is interfered with and in-

sect and micro-organic life multiplies rapidly. Thus with the coming of the rainy season there is a marked increase in the death rate. This rise in the early part of the monsoon rains is due to dysentery, diarrhea and cholera, which are, in part at least, caused by impurities in the water supply. Fevers are prevalent during the latter part of the wet season. The dry season likewise has its unhealthful conditions. As the rains cease and the moisture evaporates the water supply becomes greatly reduced. The only supply is muddy puddles, and rivers which may have been reduced to a chain of muddy pools. If the monsoon fails, conditions are aggravated, the water supply is polluted by bathing, by the washing of clothes, and by the watering of cattle. In this way the plague of cholera is added to the suffering due to famine.

As stated at the beginning, many more cases of response to rainfall conditions in India could easily be shown, and those considered in this article could very profitably be more fully worked out. But what has been suggested here, though perhaps only a beginning, certainly shows an exceedingly close relation between the rainfall of India and the life of man in that country.

LAMASERY LIFE

By FRANCIS H. NICHOLS[1]

A lamasery six miles from Wei Si, Saturday, Feb. 13, 1904.

For the past fortnight I have been a member of this religious community, where I am studying Buddhism and Lamaism at first hand, obtaining a better knowledge of the language and having an experience which has fallen to the lot of very few white men. As the weather is now too cold for an immediate advance through the mountains to the westward, I shall remain here until after the first of March. Why and how, in defiance of both Chinese and Tibetan rules, I, a foreigner and a "devil," should be accorded this privilege I can not write here.

I would only advise any other white man who wishes to make the same experiment to first give lessons in English to a mandarin's sons. As this diary is my only available memorandum book, I shall write here an outline of some of the things which I have observed and learned.

How a Lama Lives

In this community are seventy "trabas" (*i. e.*, lamas of the second rank). Their ages range from seven to seventy. I am convinced that more than a third of the population of Tibet are lamas.

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[1] Francis H. Nichols was only a little over thirty-five years old when he died in Tibet. Three years earlier, in 1901, he had been commissioned to visit the famine districts of Western China and report on the distribution of the fund which Americans contributed to the relief of suffering. A keen observer and an earnest student, he saw, in the course of his work, much of inner China and its people. He recorded his observations and studies of Chinese life in a brilliant book "Through Hidden Shensi," published in 1902.

In the fall of that year Mr. Nichols planned another expedition to Western China and Tibet with the intention of reaching Lhasa and making a study of the Tibetans and Lamaism. His plans were approved by the Council of the American Geographical Society and its coöperation enabled him to start for China in March, 1903.

The Imperial Government at Peking gave him every facility. He reached the eastern frontier of Tibet in May, 1904; and it was while he was near the frontier that he was received in a friendly spirit at the lamasery near Wei Si, where he began the studies which he hoped to continue throughout his sojourn in Tibet. He wrote in his diary the account here published of what he saw and learned. It is the story of a remarkable experience and may be regarded as an earnest of the good and original work he would have done had his life been spared. It throws a little new light on the debased form of Buddhism that is practiced in Tibet.

Mr. Nichols wrote to his mother that he had sent the diary containing this narrative to the American Geographical Society. The diary was never received; and the Society is indebted to Mrs. Nichols for the copy of it, which her son sent to her.

He was defeated in his purpose to travel westward towards Lhasa by the refusal of his carriers to follow that route. Undaunted, however, he made his way to Mandalay in Burma and from there to Darjiling, India, and thence to Gyangtse, Tibet. He died on December 29, 1904, in the field he had hoped to investigate.

Short or extended accounts of Nichols's journeys were published in the *Bulletin* as follows: Vol. 36, 1904, pp. 384, 575, 637, 719; Vol. 37, 1905, pp. 339-356, p. 64 (obituary).

FRANCIS H. NICHOLS

Born in Brooklyn, N. Y., October 31, 1869.
Died at Gyangtse, Tibet, December 29, 1904.

In every family where there are five sons or more one is compelled by law to be a lama. Besides this, whenever a child has any of the "sacred signs of Buddha," of which I shall speak later, its parents regard it as their duty to place it in a lamasery.

In some parts of Tibet there are lamaseries of women. Although woman lamas are not as numerous as men, they number many thousands. The fact that lamas of both sexes are bound by the strictest vows of celibacy and chastity is one reason why the population of Tibet is so scanty in proportion to the great extent of the country.

A child is placed in a lamasery at the age of seven and is supposed to remain there during the rest of his or her life.

But lamasery rules do not impose upon the devotees the hardships of Romanist monastic vows. The lamasery, selected by parents for their children, is invariably the one nearest the town in which they live. The parents are at liberty to call on their child whenever they wish to do so and the child is allowed to visit his parents at stated intervals.

In western Szechwan and Yunnan the only physicians are lamas. Nearly all of the older lamas have a knowledge of medicine (as it is practiced in Tibet). They are constantly employed in visitations to the sick in the surrounding country. On errands of this kind they travel in groups of three or four and are sometimes gone from the lamasery for weeks at a time.

It is the sacred duty of every lama to make a pilgrimage to Lhasa at least once in his life. In order to accomplish this a three years' leave of absence from the lamasery is granted him. As the pilgrimage, even by very slow stages, can not occupy more than eight or nine months, he has two years to himself, which he usually spends in traveling about the Dalai Lama's empire, which, to him, is the whole world.

One of the buildings of this lamasery enclosure is a school for boy lamas. Here, at a row of benches, sit the little Tibetans, with shaved heads, droning away at the sacred books. Their entire school curriculum consists in learning by heart the Buddhist prayers. These are always recited in a sing-song that sounds something like iambic scanning. The lamas live in small but comfortable rooms in houses near the temple. Except on the sacred days, they spend most of their time in their rooms squatted on the floor mumbling prayers.

At 7 o'clock in the morning and 4 in the afternoon a gong announces meal time. Every lama takes a wicker scoop and a bowl and goes to the kitchen, where he receives a portion of the diet on

which he must subsist all his life. This is *tsamba* (Tibetan tea) made with butter and an occasional slice of pork. Liquor of all kinds and the smoking of opium and tobacco are rigidly prohibited, although all lamas use a kind of snuff called *numtsa*.

This lamasery has two presiding officers. One is the Ta-lama or high-priest. He spends most of his time in his room praying to the Dalai Lama or contemplating. The other officer is called Kenpo. His work is that of steward and manager. It is his business to buy the lamas' food, keep the building in good repair and see that the paint and gilt on the idols are always bright. The lamas take turns in being Kenpo. The term of office is three years. The present incumbent will retire within a month. He is a big jolly chap and my best friend in the lamasery. As soon as he has laid aside the duties of office he will begin his pilgrimage to Lhasa. It is possible that he will accompany me when I leave here.

It is a Tibetan belief that no lama can ever suffer from illness. When his present incarnation is completed "Sangee" (Buddha) will call him; but he will never die as ordinary mortals do and he will always be free from bodily infirmities. The lamas among whom I live all apparently enjoy excellent health, although several suffer from rheumatism and some of the older men are victims of goitre.

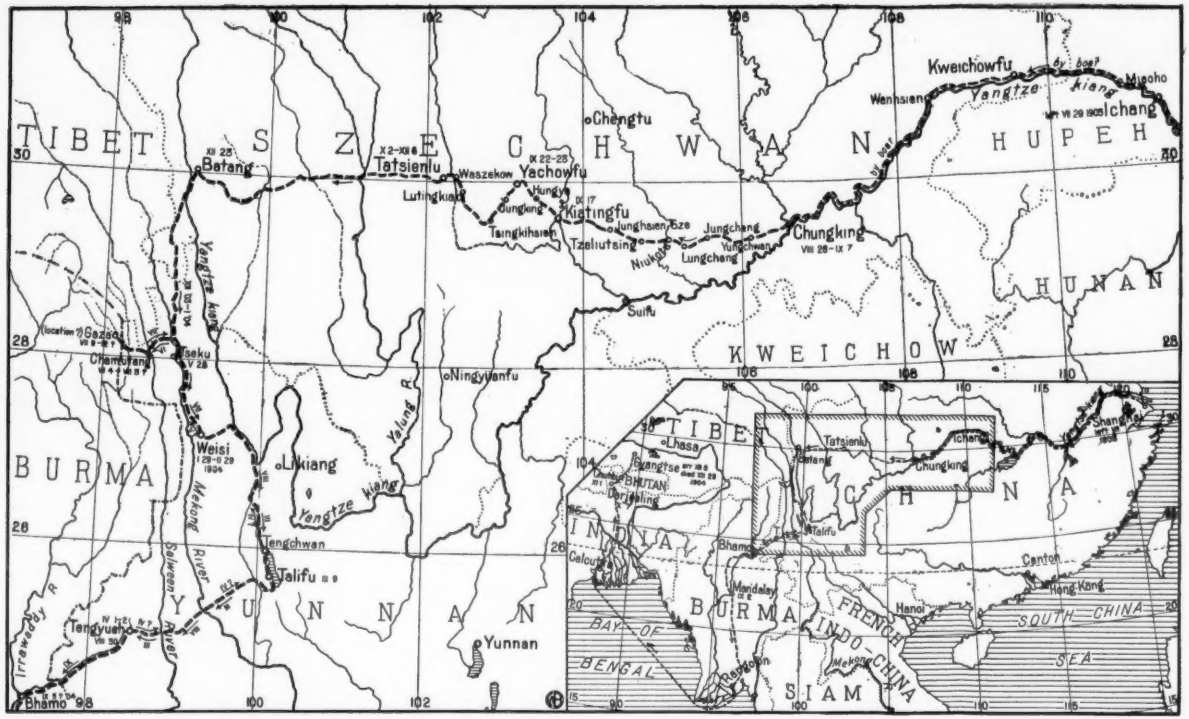
The Living Buddha

The chief attraction of this lamasery is "Gendru," or living Buddha. Not all possess "Gendrus" and those that do are very proud of them and advertise them extensively.[2]

Our Buddha is supposed to be a reincarnation of Gam-apa, who ranks fourth among Tibetan gods. The living Buddha is now twenty years old. He was born in Wei Si. When he was two months old he began mumbling Buddhist prayers. The Ta-lama was notified and he decided that the boy phenomenon was a Gendru. He was brought here at the age of eight and has resided here ever since. He lives in a house which is exclusively at his disposal. Three boy lamas are detailed as his servants. Almost every day he is visited by men and women from the neighboring villages, who bring him offerings of fruit, tea and tsamba. He wears a blue mantle trimmed with yellow.

The Living Buddha and I are great friends. He seems to like to follow me about, and he asks me all sorts of questions about the "pelings." He enjoys looking at the pictures in the two tattered

2 "There are few monasteries in Tibet or in Mongolia which do not claim to possess one of these living Buddhas."—Thomas W. R. Davids.



Map of western China showing the route of Francis H. Nichols, 1903–04. Scale, 1:8,000,000.

The outline is mainly based on the China Inland Mission's Map of China, 1:3,000,000, 1913, which has been followed in the spelling of names. The route is shown by a broken line, direction being indicated by arrows and dates thus: XII 23. Beyond Tatsienlu (102° E.) the route is correct only as regards the towns shown, and conjectural between. The inset shows the entire itinerary from Shanghai to Gyangtse.

magazines I have with me. I have improved the opportunity to study him and to find out all I can about him. I have come to the conclusion that he is an exceptionally stupid boy. Despite his years he knows less than the average Tibetan boy of ten. He can not repeat prayers with any degree of fluency and he writes only with the utmost difficulty. He has an impediment in his speech and in New York he would be considered a trifle feeble-minded. The lamas all admit his mental limitations, which they deeply regret, but no one doubts for a moment that Gam-apa lives within him.

The living Buddha does not take himself nearly as seriously as do the rest of the community. I can't help feeling sorry for him. I believe that he knows perfectly well that he is a fake, but he is practically a prisoner. He can not resign his position. He must live and die a Buddha.

The Four Gods

I began the study of Buddhism by learning the names of the temple idols and their attributes. The four chief gods are Sangee, Ma-min-tze, Sham-ba, and Gam-apa. The first three are almost equal in rank and considerably above Gam-apa. The power and influence of these four pervade the entire universe, and they have set their seal upon everybody and everything.

With human beings the most ordinary signs are placed upon the thumb and fingers. The thumb is the especial member of Sangee. One of his many titles is "Angi drangmo," which means number one. Whenever a lama in praying utters this phrase, he holds up his thumb and contemplates it. In the same way the first finger belongs to Ma-min-tze, the second to Sham-ba, and the third to Gam-apa.

On most human hands the backs of the thumb and fingers are rounding in outline; but occasionally a man or woman will have one or more fingers on which, when held upright, a ridge will appear between the base of the thumb or finger and the first joint, caused by an exceptionally large muscle. This ridge is regarded as unmistakable evidence that the owner of the finger or thumb in question is under the especial protection of some one of the four gods. If the ridge is on the thumb, its owner wears the seal of Sangee; if on the first finger, of Ma-min-tze, and so on. It is considered to be the duty of parents, when they discover such a ridge on the fingers of one of their children, to place him or her in a lamasery; consequently, almost all lamas have these finger ridges and constantly contemplate them. The finger ridges, too, establish a kind of order

of precedence among lamas. A Sangee lama must be held in higher esteem than a Ma-min-tze lama, etc.

By a streak of good luck, an old lama discovered fine ridges on my thumbs, thus giving me the rank of a Sangee lama. The news of this fact spread all over the lamasery, and many lamas have called on me to look at my thumbs and to congratulate me. My two servants, who are both cheerful liars, informed all visitors that I am a "peling lama."

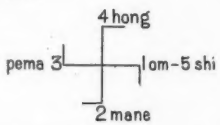
The skin between the fingers is another "sign." It represents the "Bar," or space, between heaven and earth, of which I shall write later. If the skin is especially loose it proves that the owner of the hand has a spiritual nature which can easily be projected through space.

Cho

Next to Sangee the word most often on a lama's lips is "Cho." The dictionary translation is "religion," but Cho means much more than this. It can be defined as the entire cult of Buddhism. Within Cho are included all the philosophy, learning, faith, and experience of the lamas.

Cho is worshipped and reverenced as though it were an actual entity in an entirely different sense from the western idea of abstract religion. Cho began with Sangee's earthly incarnation in Eastern India. Then, as the number of his worshippers increased, it spread southward to Ceylon, then west to the Punjab, and, last, north to Tibet and Mongolia. In this movement Cho formed a circle from right to left. The movement of Cho still continues in constantly expanding circles that are not unlike Marconi ether waves. Buddhists believe that the circles of Cho will some day encompass the whole world and that all men will worship Sangee.

The movement of Cho can be well illustrated by the Lamist use of the swastika. It is called "Lola Sangee" (the heart of Buddha) and is always drawn thus:



When a lama is contemplating he places a diagram before him and, beginning on 1, repeats the mystic Om-mane-pema-hong-shi. In his praying his words follow the swastika points from right to left, or from east to west, in accordance with the movement of Cho, the fifth word, Shi, returning to 1, where Om began, thus forming a

complete circle. Because of Cho, everything in the lama's universe moves from right to left.

In walking around a temple one must always advance from right to left. A prayer in a wheel is of no value unless it is turned to the left. In the national dances the performers never reverse but constantly whirl from right to left. It is a great sin in eating tsamba to turn the bowl towards you. It must always follow Cho and revolve from right to left, in order that its contents may obtain Sangee's blessing.

Sacred Colors

Instead of the three elements, air, earth and water, with which we of the west are familiar, the lamas have seven. In each of these Sangee has given a color as his sign or seal.

The elements and colors are:

Sky—blue,
Cloud—white,
Earth—yellow,
Water—dark blue,
Fire—dull red,
Wood—yellowish brown,
"Bar"—green.

"Bar" is the mysterious and immeasurable distance between heaven and earth, between Sangee and humanity.

Because these colors or tints are part of Sangee's design for the universe, they are worshipped in the same way as an image of Sangee himself. Streamers composed of the seven sacred colors are hung in the temples, and they occur over and over again in almost every phase of Tibetan life.

The colors are woven into the *poulous,* or blankets. In bits of leather they ornament striking flints. The mantle of a lama is red because its wearer is the aggressive force—the fire of Sangee. The hat of a Ta-lama is yellow as a reminder of the fact that he is the representative of Sangee. I once heard a theosophist woman in New York referred to as "the pink mother." I think I understand now where the phrase originated. Like a lama, the woman in question was a fire of Sangee.

The Living Buddha's chief playmate is a mongrel dog, which is held in great reverence by all the lamas. This is because, by some freak of nature, the dog has one white eye, proving conclusively that Sangee has reflected the color of a cloud in the dog's face.

A dog so distinguished must not spend his time in the company of ordinary mortals. It is his privilege to look up continually into the stupid countenance of the Living Buddha.

A Mahatma Theory

Like every other foreign traveler in Tibet, I have made diligent effort to discover a Mahatma. As the result of my inquiries I am able to write the following account of certain beings who, it is possible, may be the original Mahatmas of Madame Blavatsky.

I am not certain that such is the case. A theory is permissible in describing an unknown quantity, and for this reason I may be forgiven when I advance the theory that a Ma-hat-ma and a Ma-ha-ga are one and the same. In lamaist theology there are thirty beings who are part of Sangee himself and spend part of their time in heaven and part on earth. Their ordinary title is "the Hlamou," and by this name they have been referred to by foreign writers on Lamaism. But I have discovered that they have another and more sacred name. In speaking of the Hlamou, lamas sometimes call them Ma-ha-gal-go or, more frequently, Ma-ha-ga—a contracted form of the same word. The first syllable may be simply the Hindoo prefix Maha, meaning great, or it may be derived from the Tibetan root *ma*, mother. The latter half of the word is merely the verb gal-wa, meaning "to cross over," as Ma-ha-ga may "cross over" from one place to another in an instant.

The earthly headquarters of these beings are Lhasa, but they frequently make excursions to different parts of the world. Their business seems to be to guard Cho. They are invisible to every one on earth save the Dalai Lama. He can call them when he wishes, and he frequently consults them.

They act as invisible spies, who report to the Dalai Lama any efforts that foreigners may make to reach Lhasa.

The gender of the Ma-ha-ga is feminine. They are very beautiful (at least the Dalai Lama says that they are), although they have three eyes, one in the center of their foreheads. The Ma-ha-ga know everything, can see anything, and can find out anything. Although they are invisible, they sometimes make their presence felt to especially devout lamas. It frequently happens that, after days of fasting and devotion, a lama will have an experience to relate of a visit from a Ma-ha-ga.

The Somari

The masculine counterpart of the Ma-ha-ga are the Somari. They are thirty in number, and their work and omnipotence are about the same as among the Ma-ha-ga; but the Somari seem the most real of the sixty supernatural spies. They are worshipped, are represented in pictures, and are supposed to enjoy the sacred

dances. From what lamas have told me I have formed the impression that the Somari are rather inferior to the Ma-ha-ga. In the rear of the main temple, within the lamasery enclosure, is a small building called the "Temple of the Somari."

The rear wall of the interior is painted black, and on it are depicted two skeletons dancing. These are two of the Somari. The skeleton is the lamaist method of depicting an invisible being. Fronting the picture is a big kettle-drum on which a lama beats continuously on very sacred days in order to attract the attention of any Somari who may happen to be in the neighborhood. The Somari are very popular with visitors to the lamasery. They kneel before the picture and give offerings of tsamba to the priest who beats the drum. Every Somari has three eyes.

Sacred Days—Devotional Exercises

The chief duty of every lama is to contemplate Sangee. This is done secretly, in the seclusion of his own room. Consequently little time is left for devotional exercises in public. For eleven months in the year, only three days in every month are given to exercises in the temple. But the month which I am passing in the lamasery of Wei Si happens to be the Tibetan Twelfth Moon, the month which precedes New Year's day. Because of this the period of devotion in the temple was extended to seven days, and at the close a day was set apart for the sacred dances.

The temple was especially prepared for the days of worship. Pictures on silk, illustrating the life of Buddha, were hung on the walls. Curtains were hung from four posts, forming a kind of pavilion or tabernacle. In the center was a curious object made of bamboo. Its outline gave a faint resemblance to a lotus, and, over it, were entwined the sacred colors in silk thread. On an altar in front of the image of Sangee was placed the lamasery's greatest treasure. This was a hat that is supposed to have been worn by Gautama during his earthly incarnation in India. The hat was covered with heavy red silk, so that its original appearance was completely disguised.

In long aisles extending from the altar on which was the hat were four rows of benches. At these the lamas sat cross-legged. The students and boy lamas occupied the two outside benches. The older men had the seats of honor nearest the idols. At "Sangee's left hand" sat the Ta-lama. On a table in front of him were a bell and a rattle. Two of the boy lamas were detailed to beat kettle-drums and two more held long trumpets.

The devotional exercises began at 7 o'clock in the morning and lasted until 9 at night. At 3 p. m., a short recess was taken, during which the lamas gulped a little tsamba and Tibetan tea. For all of the seven days the exercises were precisely the same. The lamas recited and read in unison Buddhist prayers. At the mention of certain words the drums would be struck, and at intervals the muttering monotony would be broken by the blare of the trumpets. Naturally this uninterrupted scanning was hard on the throats of the lamas. Most of them became hoarse. In order partially to counteract this the Ta-lama would occasionally change the scanning meter by shaking his rattle.

In front of every lama was a "porpor," or bowl, which is the one cooking utensil of every Tibetan. At intervals these were filled with hot tea by boy lamas. The devotees would swallow the contents and then keep on with their muttering.

In the afternoon the Ta-lama retired for about an hour. Four lamas shifted their positions and their prayers to the tabernacle. Then, amid a blare of trumpets, the Ta-lama reëntered. He wore a gorgeous robe of yellow silk and a pointed hat from which hung long streamers of the sacred colors. On his forehead and cheeks were three straight marks of black paint in honor of the three gods. The Ta-lama, who is at least sixty-five years old, danced around the temple three times, first on one foot and then on the other, while the boys beat furiously on the drums. His dancing ended at the tabernacle. Its curtains were thrown back, the Ta-lama entered and prostrated himself before the lotus figure in pantomime representation of "Om mane pema hong shi." Crude and barbarous as the whole performance was, I could not help but be reminded of the Exodus accounts of the high-priest worshipping in the tabernacle and of the Hebrews who "danced before the Lord."

The New Year's Dance

The day following the conclusion of the services in the temple was devoted to the sacred dance of the lamas. Early in the morning a crowd of nearly 2,000 persons from Wei Si and neighboring towns assembled at the lamasery and grouped themselves around a small field inside the outer wall of the lamasery enclosure. In the center of this field an equilateral triangle was drawn with whitewash. The triangle represented the three gods. A table was placed in the center of the triangle. Amid a blare of trumpets the lotus figure was brought from the temple and placed on the table. The lama orchestra was stationed on a portico overlooking the field. It consisted of two trumpets, a pair of cymbals, and a kettle-drum.

As the orchestra began its first discord four lama boys ran into the field. They wore tight-fitting white clothes adorned with spangles. Their faces were hidden behind masks that were excellent imitations of human skulls. The boys at once began a wild, fantastic dance. They hopped, jumped, and stood first on one foot and then on the other. They bent their bodies back and forth; they waved their arms and occasionally turned somersaults. This was the dance of the Somari, whom the boys represented. The white clothes and skulls typified the fact that the Somari are invisible. The violent gestures of the dance were a reminder of the agility of the Somari in flying and bounding through space.

As the Somari dancers left the field the Ta-lama entered. His costume was the same as on the previous day, but he carried a huge bow and arrow. After hopping slowly around the field he approached the sacred lotus and shot the arrow under the table. Then he threw away the bow and prostrated himself on the mound. This meant that he realized his position as defender of the faith and would give his life in behalf of the sacred lotus of Sangee. After the Ta-lama came four tall lamas who were masked as yaks, indicating the fact that Tibetan beasts of burden glorified Sangee as well as their masters. The yak lamas were armed with wooden swords, with which they went through a kind of single-stick exercise.

This part of the programme was followed by twenty lamas in silk robes. They all wore masks, no two of which were alike. Some of the masks represented the Somari and the lesser gods. But most of them were the faces of animals. Among the twenty lamas were a tiger, a monkey, a leopard, and a chicken.

For more than an hour the lamas danced and hopped slowly about the field to the accompaniment of the orchestral discord. The significance of this performance was that the lower animals, all having souls, worshipped Sangee, the ruler of the universe.

Then came the climax. Into the moving circle of dancing lamas suddenly dashed a lama in a long yellow robe. His head was covered with a mask representing a bull. He did not dance as the rest had done but ran madly around the field like a wild animal trying to escape its pursuers. In narrowing circles he gradually approached the triangle and the figure of the sacred flower. He prostrated himself before it, shrieking again and again "Sangee, Ma-min-tze, Shamba." An attendant lama handed him a tray on which was a knife and the feathers and clotted blood of a chicken which had just been killed. The prostrate lama held aloft these emblems. He shook convulsively and rolled on the ground. He clutched the

knife and with a quick gesture drew the back of it across his throat. He was still for a moment and then nervously tossed the feathers and blood clots over his shoulders at the crowd. He crawled a few feet on all fours, groaning and bellowing. He stopped and fell at full length before the lotus.

The acting was so perfect that even an ignorant onlooker, like myself, needed little explanation of what the pantomime meant. The lama personified a bull sacrificed to Sangee. The blood of the bull was sprinkled over the audience as the Moses of Exodus scattered the blood of the sacrifice over the Children of Israel.

Devotional Gestures

In Tibetan prayer books there are a score of words whose English translation would be merely "worship." Their difference in meaning is conveyed to the lamas by the different gestures with which the priest accompanies the utterance of several devotional words. Like everything else in Lamaism, every gesture has a meaning and significance, which, like a Masonic grip, is intelligible only to the initiated. The following are some of the gestures:

Chanselva. Clasping the hands in succession before the forehead, the nose, and the chest.

Tsogduru. Resting the right thumb on the top of the head and extending the right forefinger upward.

Sa-ma. Pressing the palm of the right hand on the right temple, the forehead, and the left temple.

See-ma has ten gestures, as follows:

1. Right hand passed over left, both palms up; three times. Signifies that Sangee's power passes over the universe.

2. Both hands, palms up, waved three times from right to left in reverence to Cho.

3. Both fists clinched, indicating that all the minor gods are part of Sangee.

4. Open hands, palms up.

5. Clinch all fingers, thumbs upright.

6. Second fingers of both hands upright, other fingers closed. Reverence to Sham-ba.

7. Thumb and forefingers of both hands form circle; other fingers erect. Circle of thumbs and forefinger passed onward from the eyes three times. Signifies the all-seeing eye of Sangee.

8. Third finger of both hands upright; other fingers closed. Reverence to Ga-ma-ba.

9. First and second fingers upright. Thumbs and other fingers

bent. Hands vertical and passed back and forth, crossing each other three times. Reverence to Ma-min-tze and Sham-ba.

10. Hands together in Chanselwa.

Devils

Fantastic and absurd as lamaism is, there is, with one exception, nothing in Cho that is immoral or repugnant to western ethics. That one exception is the belief in "Dre" or devils. Somewhere in the lowest hell, Sangee has chained the chief devil, whose name is Sa-nin-tze or Sa-tin-tze (not very far from Satan). Pictures of this fiend are in every temple. They are made as horrible and revolting as Tibetan ingenuity will permit. Although Sa-tin-tze is a prisoner, he has under his control legions of lesser devils, whose business it is to harass humanity.

Lamaist devils do not tempt men as the Christian devil does. Temptation, according to the lamas, is merely the result of a man turning his back on Sangee. The devils of Tibet injure, molest, and destroy mankind. All the misfortunes of life are the work of the "Dre sickness." Business misfortune and calamities, both individual and national, are caused by devils. They are not only "personal," but also rampant and omnipresent. Almost every lama has seen a devil and has had a personal encounter with him. Devils hate lamas because of their piety and take especial delight in attacking them. Devils are greatly afraid of guns. During the devotional exercises a Tibetan rifle was fired three times every day to scare the devils. They may be fought and killed with swords. More than one lama has told me how he has slain a devil.

My only unpleasant experiences in the lamasery have resulted from the belief in devils.

Sudenye suddenly ran amuck one afternoon. He stripped himself to the waist, drew his sword and shouted that devils were fighting against Cho. The Kenpo and I were compelled to sit on Sudenye's chest for nearly an hour before he returned to a normal state. I promptly discharged him and sent him back to Ta Chien lo. The direct cause of the outbreak was his secret smoking of opium in celebrating New Year's Day, but his hallucinations and his peculiar manner are traceable, I believe, to the morbid talk of the lamas about devils and incarnations and Ma-ha-ga, and all the rest of it.

My other servant, Yichi, walked in his sleep one night and fell down stairs. On the following evening, when the Kenpo dropped in for a little chat around the hopen, Yichi turned to him as to a

father-confessor and told him how a devil had gripped him by the throat and then had hurled him down stairs. The Kenpo looked worried and said that the Dre were evidently at their old tricks again and were hovering about the lamasery. He advised me to fire my rifle three times. I did so, and this greatly reassured the Kenpo and Yichi.

Later Yichi described to me the devil's appearance. It was precisely the same as the horrid picture of Sa-tin-tze that is pasted on the wall of the residence of the Living Buddha. Yichi had looked and shuddered at the picture so often that it had at last developed into nightmare.

Lamasery life is almost certain to get on the nerves of any man who takes it too seriously. If the average American believed as lamas do and lived their sort of life, he would be a candidate for a lunatic asylum within six months.

Notes on Lamaism

The oft-repeated statement that Tibetans are idolaters needs so much qualifying that it can hardly be said to be true. There are not nearly so many idols in Tibet as in China or Japan. It is true that any Tibetan will bow to an image of one of the four gods in order that he may never forget the great Sangee whom the image represents—in precisely the same way that a Roman Catholic will cross himself before the image of a saint. There are many other reminders of Sangee to which a Tibetan bows quite as often as to idols, such as the sacred colors or a praying stone or a Sousa (incense oven).

In my opinion, Lamaism is monotheistic in its fundamentals. Sangee is the one great god. All the rest come from him, are part of him, and exist only at his pleasure.

The resemblance between Lamaism and the Roman Christianity has often been pointed out. On my arrival at this lamasery I too felt like saying "this is the mass in Tibetan." But after a month's study I have changed my opinion.

The more one examines Lamaism the less analogy he finds between it and any form of Christian faith. A lamasery is very different from a monastery. Lamaism is devoid of priests and preachers in our sense of the word. It lacks all of the aggressiveness and proselyting spirit that are conspicuous in such religions as Mahomedanism and Christianity. A lama never tries to "convert" anybody. He regards his Cho as revelations from Sangee, and these revelations are his exclusive property. His attitude towards foreign

nations is much the same as that of the ancient Hebrew. It is part of his religion to have nothing to do with "pelings," because they worship false gods. It would be a sin for a lama even to know anything about the "peling's" God, because it might distract him from Sangee. An excellent translation of the word "peling" would be Gentile.

Lamaism is Buddhism in the most debased, intense and fanatical form; but it is much more than Buddhism. The belief in Ma-ha-ga, reincarnations, etc., have all been imported into and engrafted upon a much older and purer faith. What was that faith?

Although I can now see few points of resemblance between Lamaism and Romanism, it seems to me that there are in the west two religions or cults to which Lamaism has many points of resemblance. One is orthodox Judaism and the other is Freemasonry. Almost every ceremony and several points in Lamaist theology find a partial parallel in Exodus and Leviticus. The sacred colors are like the colors prescribed for the ark and the tabernacle. The blowing of trumpets, the cymbals, the sacrifice, even the sacred dancing, are something like the rites of the Children of Israel.

The God of Genesis set a mark on Cain. He sealed a promise with the rainbow. Sangee placed his seal on everything in the universe. The points of resemblance can easily be carried farther. I am writing only in outline.

I am not a Mason and I do not know where Masonic rites are supposed to have originated. I am familiar only with the emblems. American Freemasons have the triangle, the eye, and a peculiar-shaped emblem which they say represents a thunderbolt, but which is very similar to a masonic trowel. Like Masons, the Tibetans have many grips and gestures which all have their own especial significance and are intelligible only to believers in the Lamaist cult. Is it possible that, among this isolated and peculiar people, there has survived, in a degenerate form, the original and earliest faith of mankind? Is the Sangee of Lamaism the God of Melchizedek and Abraham?

It is too early yet to draw any positive conclusions. I have written the foregoing only because I believe this line of investigation to be original. I wish to indicate the direction in which my studies of Lamaism have led me, so that in the event of my being "finished" in the land of the Ma-ha-ga some one else may continue from the point where I have been compelled to conclude.

THE CHICAGO MEETING OF THE ASSOCIATION OF AMERICAN GEOGRAPHERS

The eleventh annual meeting of the Association of American Geographers was held at the University of Chicago on December 29 and 30, 1914. After seven years of sessions in the East, the Association again turned to the Middle West, in whose metropolis it had already met in 1907. The number of Eastern members present at this year's meeting bespoke their appreciation of the faithful and constant attendance of their Western colleagues at the sessions in the East.

The program was unusually full. No less than thirty-seven papers had been announced. Of these, twenty-four were read, and three unannounced ones were added. The papers read, grouped according to subject-matter, were the following:

General

F. E. Matthes: The Evolution of the Glacial Cirque.
W. H. Hobbs: Development of Anticyclones over Continental Glaciers.
N. M. Fenneman: The Basis of Division into Physiographic Provinces.
C. R. Dryer: Natural Economic Regions.
Cyrus C. Adams (read by W. L. G. Joerg): To Advance the Standards of Geographic Education in Our Country.
J. P. Goode: A New Series of Wall Maps for Schools.
E. Van Cleef (introduced by A. P. Brigham): Geography and the Business Man.

Regional

C. F. Brooks: The Agricultural Atlas of the United States.
C. F. Marbut: A Soil Map of the United States.
M. Jefferson: Regional Characters in the Growth of American Cities.[1]
C. F. Brooks: The Snowfall of the Eastern United States.
O. D. von Engeln (introduced by A. P. Brigham): The Interpretation and Constructive Value of Authentic Instances of Geographic Control Illustrated by a Specific Case [cement factory on Cayuga Lake, N. Y.].
R. H. Whitbeck: The St. Lawrence and Its Part in the Making of Canada.
F. Carney: Human Relations in the Glacial Lake Plains of Ohio.
F. E. Williams (introduced by L. Martin): Some Influences of the Great Lakes on the Development of Wisconsin.
E. F. Bean (introduced by L. Martin): Methods of Mapping Glacial Geology in Northern Wisconsin.
N. A. Bengston (introduced by G. E. Condra): The Influence of [the] Trans-Continental Highways [of the United States] on the Price of Wheat.
G. E. Condra: The Loesses of Nebraska.
M. R. Gilmore (introduced by G. E. Condra): Some Indian Place-Names of Nebraska.
E. Blackwelder: Origin and Development of the Rocky Mountains in the United States.
K. F. Mather (introduced by W. W. Atwood): The Canyon of the Gunnison River.
Dora Keen (introduced by H. G. Bryant): First Exploration of Some Alaskan Glaciers: Mt. Blackburn, the Harvard Glacier, College Fiord, Harriman Fiord, and Columbia Bay.
W. S. Tower: Some Geographic Factors Influencing Brazilian Trade.

[1] Published in the *Bull. Amer. Geogr. Soc.*, Jan., 1915, pp. 19-37.

W. D. Jones (introduced by R. D. Salisbury): Geography of Northern Patagonia.

V. C. Finch (introduced by L. Martin): Some Geographic Factors in the Distribution of Agricultural Products in Europe.

Ellen C. Semple: Influences of Geographic Conditions upon Ancient Mediterranean Agriculture.

W. E. Lingelbach (introduced by G. F. Roorbach): Geographic Factors in Russian History.[2]

Only the strict adherence to the time limit assigned to each paper made possible the successful completion of the program in the two morning and two afternoon sessions available.

In addition, Professor A. P. Brigham, the retiring president of the Association, read his presidential address, entitled "Problems of Geographic Influence"—an eloquent appeal for more definiteness in anthropogeographical work; and Professor R. D. Salisbury gave an illustrated lecture on Porto Rico. A memorial of the late Henry Gannett by N. H. Darton, which had been announced, was not read.

The evening of December 29 was devoted to a round-table conference, led by Professor N. M. Fenneman; on the delineation of the physiographic provinces of the United States, a topic brought up at the Princeton meeting last year by Professor Fenneman's paper on the same subject and Mr. W. L. G. Joerg's paper on the natural regions of North America. Both of these papers have been printed in Volume IV of the *Annals* of the Association, just published, of which several copies were available at the meeting. A further basis for the discussion was afforded by Professor Fenneman's outline, distributed to the members prior to the meeting, and by his and Professor Dryer's papers, enumerated in the list above. Physiographic provinces were defined as regions based on unity of physiographic history. Using as a basis the valuable maps accompanying Professor Fenneman's published paper —their detail reflects the intimate knowledge of the literature of the subject, which alone made possible their compilation—, the criteria used in delimiting various provinces and the varying character of the boundaries were discussed. The interest taken in the subject is attested by the fact that the U. S. Geological Survey is engaged on the same problem; the tentative map, as worked out by its committee, was exhibited by Mr. F. E. Matthes. The discussion closed with the motion that the Council of the Association appoint a committee to devote further attention to the matter.

At the afternoon session of December 30 various announcements were made. The officers elected for 1915 are: President, R. E. Dodge; First Vice-President, Mark Jefferson; Second Vice-President, Frank Carney; Secretary, Isaiah Bowman; Treasurer, F. E. Matthes. The advancement of the standards of geographic education in this country, the topic presented in Mr. Cyrus C. Adams's paper, is to be made the subject of the round-table conference at the next meeting. The efforts to improve geography teaching instituted by Mr. George J. Miller of the Mankato (Minn.) State Normal School—specifically his endeavors to organize a national association of geography teachers—met with the hearty approval of the Association, which pledged its support. Professor R. E. Dodge reported on the favorable circulation of the *Annals* outside of geographical circles, and Dr. A. H. Brooks spoke of the answers received to his circular letter

[2] Published in *Popular Science Monthly*, Jan., 1915, pp. 5–24.

requesting suggestions for research work, to be defrayed from the newly created research fund.

Owing to delay in construction it was not possible to hold the meetings, as expected, in Julius Rosenwald Hall, the splendid new building erected for the Department of Geology and Geography at the University of Chicago. But although not in its own home, the hospitality extended by the Department found many channels of expression. The members were the guests of the university at luncheon at the University Commons on December 29, and of Professors Salisbury, Goode, Barrows, and Tower at luncheon on December 30. The annual dinner was given at the Quadrangle Club on the evening of December 30. On this occasion, both Professor Goode and Dr. A. H. Brooks commented on the general ignorance of locational geography even among educated people and urged that it was the geographers' affair to remedy this condition. Professor Goode advocated the obligatory use in college courses of an atlas similar to the German school atlases but adapted to American requirements.

The meeting was unusually well attended. In addition to the large number of visiting and local members, a considerable number of students from the Department attended. Several of these were preparing to take their doctor's degrees in geography—an interesting commentary on the development of our science, which up to a short time ago was not recognized in our universities as a major subject for a degree. In this connection it may be remembered that the University of Chicago is, so far as known, the only one of our universities that grants the Ph.D. degree specifically in geography. The first degree was conferred in 1907; and the present considerable number of candidates bears witness to the vitality of the Department.

FIRST EXPLORATION OF THE HARVARD GLACIER, ALASKA

The first exploration of the Harvard Glacier, at the head of College Fiord, in Prince William Sound, Alaska, is reported by Miss Dora Keen, of Philadelphia, as the result of her third expedition to Alaska, from which she returned last fall. She also continued the observations of earlier expeditions relating to the changes taking place in twenty-five glaciers of College Fiord, Harriman Fiord, and Columbia Bay, Prince William Sound. Six weeks were spent in the field.

Miss Keen's previous experience was among the glaciers of the Alps, and in two expeditions to Alaska, entirely on glaciers, on the occasion of her first attempt and final ascent of Mt. Blackburn, 16,140 feet. Her assistants were Mr. G. W. Handy, of McCarthy, Alaska, who had led her up Mt. Blackburn, an expedition requiring five weeks of dangerous glacier travel; G. A. Rabehl, also of McCarthy, experienced on Alaskan glaciers; and Mr. H. L. Tucker, of Boston, topographer, who had taken part in the Parker-Browne ascent of Mt. McKinley to 10,000 feet (1910), and the Yale Peruvian expedition's first ascent of Coropuna, 21,000 feet.

The first object was to explore and map the hitherto unvisited portion of the Chugach Mountains in which the Harvard Glacier heads, and if a pass could be found, to cross to the Matanuska Glacier, on the other side of the range, and return to civilization by the valley of the same name. This would have involved a traverse of some fifty miles of ice and snow, almost all above timber, and a succeeding one hundred miles over a hard wilderness trail almost entirely through uninhabited country, coming out at Cook Inlet.

The Harvard Glacier has a tidal ice-cliff 350 feet high and a mile and a quarter wide. A constant fall of ice from the face causes great waves and "milling" of the floating ice, both of which make a close approach in a small boat difficult and dangerous. A safe landing was, however, effected. Seracs made travel on the glacier itself impossible, so that all supplies had to be

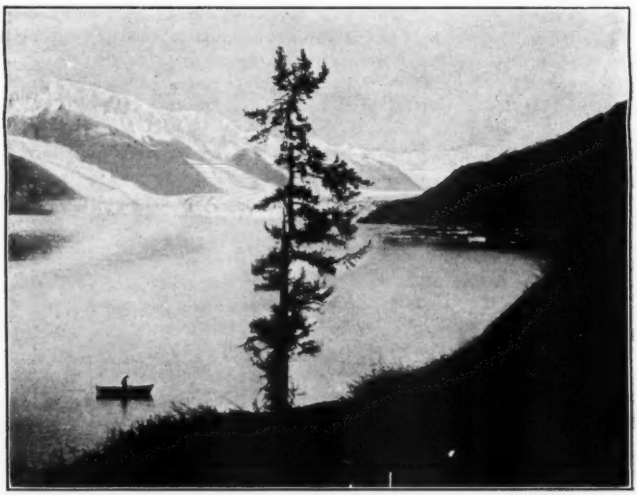


FIG. 1—Harvard Glacier from four miles away The ice-cliff is 350 feet high and 1¼ miles wide, with five large tributaries on each side of it. The glacier is eighteen miles long.

relayed painfully on men's backs, and a hard way found at the edge of the ice was the only possible route for seven miles. Timber stopped at tidewater, and even willows, at this seven-mile point, at only 2,200 feet, so that fuel oil and stove had to be carried the entire distance, in addition to food, tents, snowshoes, etc.

Finally, mounting the glacier itself, another nine miles over endless crevasses brought the expedition to the sources of the glacier, which proved to be eighteen miles long. The party had to halt at a point where the shattered condition of the ice made further progress unsafe, if not impossible, even on snowshoes. The divide was perhaps ten miles further up the Brunonian Glacier, as the main tributary to the northwest was named, and apparently at an elevation of about 7,500 feet; but as it was impossible to proceed further up this glacier

and there was no pass, the return had to be made by the same route. The main axis of the glacier ended in a head wall, with mountains ranging up to about 10,000 feet entirely snow-covered.

Sliding snow and steep grades made any serious mountain ascent unsafe, especially in bad weather. Because of the hard going, relaying, and bad weather, this part of the work took nearly four weeks. Its results are observations for the first map of a hitherto unvisited and unmapped region, and observations of snowfall and temperature, which will throw light on the alimentation of the glaciers.

FIG. 2—On a narrow ice bridge between deep crevasses, exploring the Harvard Glacier. Note the heavy packs, Miss Keen in the rear.

The second purpose was to continue the observations of earlier expeditions, *viz.:* the Harriman, U. S. Geological Survey, and National Geographic Society expeditions. Photographs of all the leading glaciers in College Fiord, Harriman Fiord, and Columbia Bay were made from the same stations occupied by those parties, the object being to determine, by a comparison of views, whether the advance or shrinkage previously noted in some of these glaciers is continuing. A series of such observations has great value for a study of causes, namely, whether the marked changes noted in some cases are due to climatic variations or to earthquakes.

Photographs of some twenty-five glaciers were obtained, and in many cases evidence of recession or advance of nearly a quarter of a mile was found. Close approach was sometimes difficult or dangerous because of the amount of falling and floating ice, but care was exercised and there were no mishaps. The expedition was undertaken at the suggestion of Prof. Lawrence Martin of the University of Wisconsin, junior leader of the 1910 and 1911 expeditions of the National Geographic Society.

SIR DOUGLAS MAWSON IN NEW YORK

Sir Douglas Mawson lectured in Aeolian Hall, on Sunday evening, January 17, on the experiences of the Australasian Antarctic Expedition which went to the coast of Wilkes Land under his command in 1911 and returned in 1914. The hall was crowded and the audience showed its hearty appreciation of the unusually excellent moving pictures and other views and of the explorer's lucid explanation of them. The lecture was given under the auspices of the American Geographical Society and the American Museum of Natural History. During the introductory exercises, President Henry F. Osborn of the American Museum of Natural History, Vice-President John Greenough of our Society, Admiral R. E. Peary, President Herbert L. Bridgman of the Department of Geography in the Brooklyn Institute of Arts and Sciences, Dr. Frederic A. Lucas, Dr. E. O. Hovey and several other gentlemen were with the lecturer on the platform.

President Osborn opened the meeting with a few words, in which he referred to the importance of the work done by the Australasian Antarctic Expedition and then introduced Vice-President Greenough.

Mr. Greenough's Address

"On behalf of the American Geographical Society I desire to express their appreciation of the privilege of uniting with the distinguished President of the Museum of Natural History and with the eminent group of scientists and explorers here present, as also with this representative body of citizens of our metropolis, in extending to our guest of to-night a cordial welcome on this his first public appearance in this city. We have had in the past an opportunity to salute his great predecessors in the field of Antarctic exploration—first Sir Ernest Shackleton, who, so to speak, blazed the trail toward the Pole; next Captain Amundsen, who first achieved its conquest and returned in safety; and then Captain Evans, the second in command under the lamented Captain Scott, whose tragic and heroic end is fresh in our memories—and now finally we greet the lecturer of this evening, whose achievements entitle him in every way to rank with those whom I have enumerated and whose addition to geographical knowledge of the Antarctic is no less valuable and extensive than theirs.

"There is a feature which attaches to all polar exploration which to my mind seems to exalt it beyond all similar endeavor in other fields wherein a possibility or hope for material advantage is present. For whereas the prospect of treasure or commerce or settlement has incited to the opening of other world areas, so, on the other hand, the explorer in the frozen zones of south or north can be animated only by the enthusiasm for conquering danger or difficulty, of competing in honorable distinction of discovery, or of adding to scientific and geographical attainment. Where men are led by motives like these to endure suffering and risk their lives and fortunes I think that honor should be paid them as to an order of supermen and not merely as types of ordinary humanity. The history of Polar research for two centuries is replete with heroic figures of this pattern, divided among almost all the nations so fairly that no one can claim preëminence.

"The field of exploration which is to be described to us to-night is one of especial interest to the people of the United States for the reason that it embraces practically the entire outline of the land covering 60° of longitude which was declared to exist by Lieut. Charles Wilkes of the U. S. Navy in 1840. He was the first navigator to announce the presence of a continent in the southern polar area, and he gave to it the name of Antarctic Continent, and to a portion of its supposed shore the title of Wilkes Land was added by our Government. In his badly equipped vessel the *Vincennes*, of about 800 tons, he sailed along what he presumed to be the coast line of the continent for 1,200 miles, battered by ice and tempests, and he recorded the evidence upon which he based his deductions, the substantial correctness of which has since been established. The whole voyage was most gallant and skilful, as has been generously acknowledged by the lecturer of this evening. It is somewhat singular, and a fact by no means creditable to the enterprise of the Government of the United States, that for sixty years after the announcement by Lieut. Wilkes, no further exploration was attempted, and the distinction of confirming the hypothesis of Wilkes and of solving the whole Antarctic problem was left for other nations. With the opening of the present century a widespread enthusiasm for Antarctic search seemed suddenly to develop abroad, with the result that within a brief period successive expeditions under various flags other than our own had penetrated to the Pole and had determined the general character and extent of the surrounding continent. Thereupon scientific effort turned to more accurate survey and detailed study of the region, and the problems thus indicated are likely to afford ample scope to adventurous spirits for a long time to come.

"The Australasian expedition of 1911-14, under the leader who is to speak to us, has made the most considerable contribution to our information in this regard. He prepared to follow the shore which Wilkes had surmised but could not approach by reason of the vast fields of contiguous ice and recurring fogs and gales.

"Probably nowhere in the world are to be found hurricanes of such intensity and continuity as here prevail; but it is not my intention to attempt to forestall the description which the lecturer will doubtless give of them. I may be permitted to invite your admiration, however, for the wise foresight of his preparation and for the magnificent endurance of suffering on his part and his heroic conflict against dangers which brought a tragic end to two of his companions and from which he escaped only by almost incredible fortitude. Upon these personal features of the conduct of the expedition he naturally cannot dwell, but it is proper that they should be recognized and due honor accorded. It requires some little exercise of the imagination, as we listen in this comfortable room to the quiet and modest gentleman who is to address us, to figure him battling at the ends of the earth against the appalling forces of nature and carrying in his hand not only his own life but that of his companions—and all in pursuit of an ideal—a contribution to the world's fund of knowledge. This I maintain is a performance that may well arouse our enthusiasm and admiration.

"If the knowledge of his achievement necessarily links itself with the memory of our own countryman who ventured on somewhat similar and adjacent paths, are we not entitled to find satisfaction in the thought that only generous appreciation and friendly rivalry is the result; and may we not cherish the aspiration that the qualities of courage and endurance shown in pursuit of a common end

in the instance before us may be an augury of like concert between our kindred nations in the attainment of worthy purposes wherever occasion may invite us?

"I convey to our visitor the assurance of your welcome and esteem, and I have the honor to introduce to you Sir Douglas Mawson of Adelaide, South Australia."

Sir Douglas Mawson's Lecture

Dr. Mawson's lecture was a popular exposition of his South Polar environment. He did not refer specifically to the scientific results of the expedition. These have already been published and were summarized in the *Bulletin* at considerable length (Jan., 1915, pp. 38-44). His moving and other pictures and what he had to say about them were full of interest and information. Sir Ernest Shackleton has said: "I consider Mawson's pictures the best ever taken." Many audiences in America have seen moving pictures of Antarctica, but none that compared with these either in subject or in clearness and vividness of delineation. All kinds of life and of scenic aspects were shown. Many scenes that Wilkes was the first to describe were there for the inspection of an American audience—the ice-strewn sea margin; the tabular ice crowding off the land to break into the characteristic Antarctic, flat-topped icebergs; the waves dashing into spray against the bergs, or the coastal ice wall, ice caverns, the inland ice cap rising rapidly from the coast to the lofty interior plateau; the animal life, including whales, sea-lions, penguins in most of their varieties, and many other animals.

The bow of the *Aurora,* apparently taken from the vantage point of the bowsprit, was shown rising and sinking in the swell and crunching its way through the ice masses as the vessel made its slow way to the south. The life of the men was depicted in their snow-buried cabin on Adelie Land, an interior that was pleasing in its suggestion of a fair degree of comfort in well-lighted quarters, with books in plenty and space enough for the pursuit of indoor scientific work.

One of the most remarkable series of views illustrated the terrible blizzards that were almost incessant. Hourly velocities of a hundred miles and more were common, and the average wind velocity for a whole year was fifty miles an hour. The scud of the driven snow, well shown in the pictures, and also the attitude of the men making slow headway against the gales, gave a graphic idea of these terrific windstorms. Pictures of men descending steep slopes were shown. They were bending nearly double, in the teeth of the wind, and would certainly have lost their center of gravity if they had not been upheld by the force of the blizzard.

Mawson's talk was almost entirely about his pictures, except when he told the pathetic story of the loss of his two comrades, Ninnis and Mertz, when they undertook their sledge journey across King George V Land; and Mawson staggered home alone, Ninnis entombed in the crevasse into which he had fallen and Mertz dying a hundred miles from camp.

Geographers will hail moving pictures of the quality that Mawson shows as a revelation of the possibilities of such views in geographical education. Nothing could more vividly impress upon the mind of the student what he reads in his text-book than such views as these of the facts of the earth and sea with their varied life and phenomena.

Dr. Mawson will make an extended lecture tour through our country. It is hoped that he will be heard on several other occasions in this city before his return home.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOCIETY

Director and Librarian of the Society. It is a pleasure to announce to our Fellows and to the geographers of the country that, on July 1 prox., Professor Isaiah Bowman, now professor of geography at Yale University, will join the staff of the American Geographical Society with the title of Director and Librarian.

It is especially gratifying to the Council that, in its desire to serve the best interests of geography in our country, it has been able to enlist the experience and the efficiency of Professor Bowman in the promotion of our future work.

The Cullum Geographical Medal Awarded to J. Scott Keltie. The Council has awarded the Cullum Geographical Medal to J. Scott Keltie, LL.D., Secretary of the Royal Geographical Society. Dr. Keltie has been prominent in geographical work for over thirty years. It was his investigation of the position of geographical education in the countries of Europe that initiated the movement which resulted in the introduction of geography in the British universities and the present advanced standards of geographical education throughout the kingdom.

The Daly Medal Awarded to Professor Paul Vidal de la Blache. The Council, at its meeting on January 21, awarded the Daly Medal for Geographical Research to Professor Paul Vidal de la Blache, Professor of Geography at the Sorbonne, Paris, and one of the great leaders in the scientific development of geography in France.

Annual Report of the Council. The Council, at its January meeting, approved the following Annual Report to be submitted to the Society:

January 21, 1915.

To the Fellows of the American Geographical Society:

In presenting the history of the Society for the year 1914 the thought at once presents itself as to what effects have resulted or may be expected from the European war in its relation to this organization. Our correspondence has extended in the past to more than 600 foreign associations, and although a partial interruption of communications has been brought about, yet for the most part this may be regarded as temporary and we may expect that activities will not be permanently disturbed. Sundry plans of research have been abandoned or postponed both in this country and in Europe. But interest in the general science to which our Society is devoted appears to have been stimulated rather than diminished by recent events. An indication of this increased public interest is afforded by the fact that more than 25,000 people have visited the Society's home during the past five months to inspect the various maps and literature bearing upon the contest which we have from time to time placed on exhibition. Speaking broadly, we have no reason to feel otherwise than satisfied with the field of usefulness to which we are dedicated.

The number of Fellows on December 31, 1914, was 1,127, of which 364 were Life Fellows. This shows a diminution of membership of 58, which is probably explained by the temporary general depression in commercial and industrial affairs.

There have been added to the library and map room during the year 3,700 books, 6,303 periodicals and pamphlets, 48 atlases and 4,558 maps. A special donation of a large sum for library purposes has rendered possible the purchase

of many especially valuable publications needed to complete various departments in our collections, so that we feel that both in books and maps our library is fully equal to any collection of similar character now existing in this country.

The Society's *Bulletin* has been published with regularity each month, and it is believed shows increasing volume and importance. There were published therein, besides the Geographical Record, the Book Reviews, Map Notices, and Bibliographical Lists, 60 original papers. The index to the volume for 1914, about to go to press, is over 100 pages in length and is a comprehensive record of the geographical literature and cartographic output of all countries for the period covered.

Twelve meetings of the Society were held, at which addresses were made by Albert Bushnell Hart, Frederic Dean, Isaiah Bowman, James W. Erwin, Mrs. Henshaw, George H. Moses, L. A. Bauer, Dean Conant Worcester, Mr. and Mrs. Workman, William Webster Ellsworth, Arthur Stanley Riggs, and Douglas Wilson Johnson.

Three of the gold medals of the Society were awarded during the year. The Cullum Geographical Medal was awarded to Miss Ellen Churchill Semple and also to J. Scott Keltie, Secretary of the Royal Geographical Society. The Charles P. Daly Medal was awarded to Prof. Dr. Albrecht Penck, Professor of Geography in the University of Berlin. Mr. William Churchill of New York City was elected a Corresponding Member.

The joint meeting of the Association of American Geographers and this Society was held in the Society's building on April 3-4, 1914. The attendance was gratifying and the papers contributed elicited much interest, and in every way the gathering was pronounced most successful. The alliance of this Society with the Association of American Geographers promises in many respects to add to its influence and its ability to be of service.

It is becoming constantly more apparent that a broad opportunity exists for this Society to assist in encouraging the study of geography in the educational organizations of the country, and its efforts are constantly centered more and more in this direction. We aspire ultimately to extend our connections and our facilities so as to embrace all of the teaching or student agencies throughout the country which may find benefit in our equipment.

Whilst not losing sight of the value of research expeditions, it seems that our Society can with especial advantage devote itself to the educational side of its activities.

For a statement of the general condition of its finances and the application of its current revenues reference is made to the report of the Treasurer.

A Memorial Volume commemorative of the Transcontinental Excursion of 1912 has been prepared and will be distributed to such of our Fellows as indicate a desire to receive it. The work is highly scientific and published in four languages, the volume containing 26 articles written by our guests, and these articles form a valuable contribution to scientific literature and have especial interest as a commentary on phases of our domestic geography as they appeared to the most eminent foreign scientists on that excursion.

Arrangements have been made with Professor Isaiah Bowman of Yale University that after July 1 he shall join our staff as Director of the Society's work, and it is hoped thereby that the efficiency of the organization will be further enhanced.

In conclusion the Council feels justified in the belief that the Society continues to enjoy in unimpaired measure the approval of the scientific public interested in geographical knowledge; and it desires to record its appreciation of the zeal and ability shown by the staff engaged in the conduct of its affairs.

Respectfully submitted on behalf of the Council.

JOHN GREENOUGH,
Chairman.

HAMILTON FISH KEAN,
Secretary.

Meetings of the Society. A meeting of the Society was held in the Engineering Societies' building, No. 29 West 39th Street, on Tuesday evening, Dec. 22, 1914, Vice-President Greenough in the chair.

The following persons, recommended by the Council, were elected Fellows: Miss Christobelle Crain and Thomas Cooper Shotwell.

Dr. Douglas Wilson Johnson, Professor of Physiography in Columbia University, addressed the Society on "The Physical Geography of Western Europe in Its Bearing upon a Military Campaign." The lecture, copiously illustrated with lantern views, gave a very edifying and interesting conception of the influence of topography in shaping the conduct of military operations.

On Tuesday evening, Jan. 12, an extra inter-monthly meeting was held at the Engineering Societies' Building, at which William Elliot Griffis, D.D., L.H.D., addressed the Society on "Northern France." Lantern views were shown.

NORTH AMERICA

The Coast and Geodetic Survey. The Secretary of Commerce, in his report for 1914, speaks strongly for more liberal support of the work of the Coast and Geodetic Survey, which is the oldest scientific service of the government. The Secretary says that the past attitude of the government towards the Survey, as relates to its housing, its vessels, and the necessary apparatus for its work, has been "like that of a wealthy and prosperous man refusing to give to his loyal children the necessaries of life." Citizens have been drowned (31 in one case) and private and public property has been repeatedly lost because the government has not more rapidly provided the force and apparatus with which to survey and chart the dangerous waters of the Pacific, and particularly of the Alaskan coast. Secretary Redfield adduces facts to show that the hydrographic survey of Alaskan, Hawaiian and Philippine waters should be completed as soon as possible for the safety of navigation. In the Philippines, naval operations have been embarrassed and vessels have grounded owing to the lack of sufficient surveys. At the present rate of progress it will require twenty-five years to complete the preliminary surveys in Alaska alone, and there will still remain a large number of detailed surveys needed for complete safety to navigation. With regard to the geodetic work of the Survey, the Secretary quotes from the leading authorities of the world as to its superior quality and its great importance. These precise surveys are the foundation of all chart and map-making, and all boundaries and land measurements are referred to them. The Secretary shows in detail how inadequate is the present housing of the Survey and declares that "it is a shameful thing to send officers of the United States to sea in such ships as the *Endeavor*, the *Gedney*, and the *McArthur*." The scientific men of the country undoubtedly approve of the Secretary's appeal for adequate support of the vital work of the Coast and Geodetic Survey.

Eruptions of Lassen Peak. Mr. J. S. Diller of the U. S. Geological Survey reports that the volcanic activity of Lassen Peak is still manifest. The *Bulletin* (Vol. 46, pp. 740-755, and Vol. 47, p. 47) announced thirty-two eruptions from May 30 to Aug. 23, last year. In a note dated Nov. 4, 1914, which Mr. Diller appends to his paper on the eruptions (*Mazama*, Vol. 4, No. 3, Nov., 1914, pp. 54-59) he says:

"The foregoing article was written in the latter part of August. Since then Mr. Rushing has reported fifteen eruptions from the 33d, Sept. 5, to the 47th, Sept. 21, inclusive. Newspapers reported the 56th eruption on Oct. 16. They continue frequently, and apparently with increasing vigor. Rumblings have been heard at a distance of twenty miles, and slight but distinct shocks are reported at a number of places. The shocks are due chiefly, if not wholly, to a different cause more or less closely connected with the active faulting about the northern end of the Sierra Nevada.

"Flashes of light and balls of fire have been reported and samples of the ejected molten material are said to have been found, but as yet the reports are not satisfactorily confirmed. Whether Lassen's activity will finally yield a

solfataric area on its summit, like those about its base, or become a more fully active volcano of the Strombolian type, or neither, is as yet not a matter of certainty."

The Lakes of Wisconsin. The second volume in the series by Birge and Juday on "The Inland Lakes of Wisconsin" deals with the physical features of the lake basins (C. Juday: The Hydrography and Morphometry of the Lakes, *Bull. XXVII, Wis. Geol. and Nat. Hist. Survey*, 1914, xv and 132 pp.).

A notable feature is the series of twenty-nine colored maps, the best series of lake maps thus far published in America. These are (1) topographic maps, reproduced from United States Geological Survey quadrangles on the scale of an inch to a mile, showing contours for the land surrounding the lakes; and (2) hydrographic maps, with contours and tints of blue for the lake basins. The latter are the work of the Wisconsin Geological and Natural History Survey, most of the surveying having been done by instructors in the College of Engineering at the University of Wisconsin. Some of them were published several years ago without description. They are on scales of from 1:13,100 to 1:45,400.

The text fits in between Birge and Juday's earlier bulletin on "The Dissolved Gases of the Water and Their Biological Significance" and the volumes planned for later, on temperatures, plankton, etc. It also serves as a general description of lakes for students of physical geography. The origin of the lake basins and their shore features is summarized partly from the bulletin by Fenneman on "The Lakes of Southeastern Wisconsin" and partly from Dr. Juday's own observations. For fifty-four of the lakes full data are given on the length, breadth, area, depth, length of shoreline, volume, slope of bottom, and shore development. The latter is a new term meaning the ratio of the length of the shoreline to the circumference of a circle whose area is equal to that of the lake. This is the same as the "coast factor" as used by Dryer, except that the latter applies it to continents rather than water bodies. The maximum depths of 185 other lakes are given.

In northern Wisconsin is a lake district where the ratio of water to land surface approaches that in parts of Canada and Finland. In Vilas County, for example, 140 square miles out of the total 907 square miles of area lie beneath the lakes. Most of the lakes studied are small; and the studies are rather detailed and very creditable. Lake Mendota at Madison, for example, is 9.50 by 7.4 kilometers, contains 39.4 square kilometers of surface and has a depth of from 12.1 to 25.6 meters. It contains 478,370,000 cubic meters of water, and within it 4,500 soundings have been made. Undoubtedly this is the best-studied lake in America. For other lakes, where less detailed studies have been made, Lake Geneva is typical, having an area of 22.1 square kilometers within which 656 soundings have been made. The largest lake in Wisconsin is Winnebago, with an area of 557.52 square kilometers, but it is only about 6.4 meters deep. The deepest is Green Lake, 72.2 meters. Its area is 29.72 square kilometers, within which 674 soundings were made. The use of the metric system is justified in view of the enormous amount of computation and the utilization of this bulletin in the future by foreign students of lakes; and yet it is a fact that the lack of figures in feet and miles will render this splendid monograph unhandy for use by most Americans. LAWRENCE MARTIN.

The Age of Niagara Falls. The writer's attention has been called to the unfortunate wording of a sentence in his note in the *Bulletin* (September, 1914, p. 680), which implies that F. B. Taylor's recent work makes it impossible to use Niagara as a time measure. What was meant, however, was that previous calculations were upset and the problem made more complicated. In a review of another paper of Taylor's, sent to *Zeitschrift für Gletscherkunde* at the same time as the one noted above, but not yet published, the writer has stated the facts as follows: In America the best data regarding the length of post-glacial time come from the gorge and falls of Niagara. The most recent and reliable computation has been made by F. B. Taylor (*Geologic Atlas of the United States, Niagara Folio, No. 190*, Washington, 1913). This report contains a new topographic map of the cataract and gorge on the scale of 1:12,000, with contour interval of 10 feet. It was surveyed in cooperation by

the Geological Surveys of Canada and the United States. The glacial geology is mapped on this sheet and also on a smaller scale map (Niagara Quadrangle, 1:125,000), which shows the moraines, beaches, glacial lake deposits, and abandoned spillways of the earlier lakes. Taylor has made careful estimates of the amounts of water going over Niagara Falls (a) at the time of early Lake Algonquin, when the Niagara River was only one of five streams falling over the Niagara escarpment; (b) at the Kirkfield stage of Lake Algonquin, when 85 per cent. of the present volume was absent because the outlet of Lakes Superior, Michigan, and Huron was elsewhere; (c) at the Port Huron–Chicago stage of Lake Algonquin, when the volume was from 10 per cent. more to 10 per cent. less than the present; (d) at the stage of the Nipissing Great Lakes, when the volume of Niagara was as small as at the Kirkfield stage; and (e) during the existence of the present Great Lakes. He concludes that the estimates of 7,000 to 12,000 years are too low and those of 50,000 to 100,000 years are too high. After computing the time of making the five different sections of the gorge, he gives us 20,000 to 30,000 years as the age of Niagara. No more careful and detailed work, with more rigid reasoning, has been produced in American glacial geology. LAWRENCE MARTIN.

Detailed Report on Preston County, W. Va. This report, issued by the West Virginia Geological Survey on September 1, 1914, contains 566 pages and is illustrated with forty-nine half-tone plates and ten figures in the text, and three maps covering the soils, topography, and geology of the county. In addition to the detailed description of all the geologic formations exposed in Preston County, the geologic map gives the structural contours and outcrop of the Upper Freeport coal, the most important mineral horizon of the area. The soil and topographic maps will prove of great value to every interest, including agriculture, road improvement, water resources, etc.

SOUTH AMERICA

The Latest South American Expedition. The daily press announces that the Field Museum of Chicago and the American Museum of Natural History have sent to South America a joint expedition, which sailed on the United Fruit liner *Metapan*. The first destination is La Paz, Bolivia, whence the party will cross the eastern ranges of the Andes and descend either into the basin of the Beni or of the Mamore River, and eventually reach the Amazon by the Madeira. In the region of the two tributaries of the Madeira above mentioned there is a very large area that has never been covered by collectors. The party consists of Messrs. Lee G. Day, Alfred M. Collins, George K. Cherrie, Robert H. Becker and W. F. Walker.

AFRICA

Italian Occupation of Ghat. The occupation of the oasis of Ghat, in the Sahara, by an Italian force of Tripolitan troops under the command of Captain Giannini is reported in *L'Africa Italiana* (Sept.–Oct., 1914, pp. 204-205). The town is at the junction of three important caravan routes, two of which connect the seaport of Tripoli with Kano and Zinder respectively, while another extends between Philippeville and Murzuk. The expedition left Sebkha on July 4 and reached Ghat on Aug. 12. The astronomical position of the town had been previously determined by French officers as 24°57′ 14″ N. and 10°17′ E.

ASIA

Dr. de Filippi's Discoveries. *The Geographical Journal* (December, 1914, pp. 528-534) prints further information from Dr. de Filippi's scientific expedition in the Karakoram, giving some important geographical results of the work of the party. Dr. de Filippi is expected to return soon; Professors Marinelli and Dainelli started home on August 26 by way of Kashgar and Russian Turkestan. In his recent summing up of the geographical work of the past season, Mr. Douglas Freshfield, President of the Royal Geographical Society, said that the de Filippi expedition "has carried out its varied programme with

wonderful completeness. Topographic surveying forms only a part of its work; a large amount of careful mapping has been done, and our knowledge of those enormous ranges has been greatly enlarged."

One of the main aims of the expedition was to ascertain the position of and to survey the Indo-Asiatic watershed between the Siachen glacier and the Karakoram Pass. During this work the party made the remarkable discovery that the Remo glacier gives rise to the Shyok River, whose waters flow into the Indus River, and also to the Yarkand, whose waters join the Tarim and are lost in the Takla Makan desert of Central Asia. "This is only an instance of the general uncertainty of the watershed which we have encountered in the whole region, and which, no doubt, is intermediate between an ordinary range and the hydrographical conditions of the closed basins and indifferent watersheds of the Tibetan plateaus."

AUSTRALASIA AND OCEANIA

The Scientific Work of Baron Nicholas Miklucho Maclay. All geographers, in the eighties of the last century, knew of the excellent geographical work done by this Russian scientist. Those who remember his devotion and his fearlessness in the pursuit of knowledge in unknown fields regret that most of his writings have not yet been published. A short account of his achievements is published in *Man* (Dec., 1914, pp. 198-200). From 1867, when he undertook an expedition to the Red Sea at the age of twenty-one, to the time of his death in 1888 he was engaged in anthropological and zoölogical investigations, which added considerably to our knowledge of Asia and Australasia. He was particularly known for his work in New Guinea, where he was left alone with two servants in 1871. His investigations on the Maclay coast of northeast New Guinea and the neighboring islands rank among the earliest and best contributions by Europeans to the geography of the region.

He visited the south-west coast of New Guinea in 1874, but could make only a two months' sojourn on account of native hostility. In 1876 he visited the Papuans of the north coast of the island, among whom his medical knowledge insured him a cordial welcome. Three years later he visited the islands of New Caledonia, New Hebrides, Solomon, Admiralty and Hermit and published valuable information concerning them in English, German and Russian. On his return to Russia in 1887 he began to write the results of his studies, but death in the following year ended his labors. Only the first volume of his memoirs saw the light. His valuable manuscripts still await rescue by some scientific editor.

EUROPE

H. B. de Saussure's Geographical Work. Professor A. Michieli calls attention in the *Bolletino della Reale Società Geografica* (Dec. 1, 1914, pp. 1259-1280) to the spirit of sound geographical observation exhibited by this noted Swiss naturalist throughout his publications. De Saussure had felt the influence of the inquiring spirit which guided scientific thought during the latter half of the eighteenth century. In this, as well as in breadth of vision, he may be compared with von Humboldt. Many of his memoirs may be classed under the head of physical geography. His narratives of travel contain passages the geographical value of which subsists to this day. They are exhibited at best in the work "Voyage dans les Alpes, précédés d'un Essai sur l'histoire naturelle des environs de Genève," of which various editions were brought out between 1798 and 1803. The results of seven crossings of the Alps are embodied in this masterpiece of eighteenth-century scientific literature. The text is described as a storehouse of knowledge patiently acquired, and wherein the learning of the time is supplemented by the author's own observations and reflections. The point of chief interest in De Saussure's work consists in his constant remembrance of the unity of nature amid the variety of detail revealed. He was thus enabled to trace relations between manifestations of life on the earth's surface and their physical foundations. Recognition of this connecting fact was noteworthy for the period.

POLAR

Antarctic

Shackleton Starts for the Antarctic Continent. The *New York Times* printed on January 11 a cablegram from London giving this dispatch from Sir Ernest Shackleton:

"The *Endurance* sails from South Georgia to-day. All on board are well. We have been delayed by the ice which is unfavorable. Owing to this I do not expect to cross the Continent until next season."

The *Bulletin* (January, p. 52) reported a message from Shackleton at South Georgia to the effect that his vessel the *Endurance* was to go south to examine the pack ice and see whether it was loose enough to go into without unnecessary delay. When she returned he intended to embark the Antarctic party, push right into the pack and try to reach the continental coast in about 77°30′ S. lat. If he reached this point at a sufficiently early date he would start across the Antarctic Ice Cap this season. Should the sea ice conditions, however, be too unfavorable for a quick journey to the Antarctic coast, his trip across the Continent would not begin until October, 1915.

The above cablegram from London apparently means that the *Endurance* reported obstructions which will lengthen the voyage from South Georgia to the Antarctic base, so that Shackleton feels he can safely announce that he will not leave the coast for the journey over the continent to Ross Sea until October next.

GENERAL

Book Reviews. Book reviews mean much to me as a book purchaser. I wish a review would tell me whether a book is one that I want or not, and to do that it must give me a pretty accurate account of its contents and the style in which the contents are treated. I wish the reviewer would read the book, or at least important parts of it, as it would then be easier for him to know what to tell. Further, I wish him to know a good deal about the book's particular subject, enough, at any rate, to be able to tell me whether the book is a compilation, or repetition of old matter, or an addition to knowledge. This will involve the practice of reading German books, if the subject is geographical and includes any other part of the world than the limited areas of England or the United States. I wish the reviewer could tell me whether the new things in the book appear to be true, or, at least, reasonable, and whether the treatment is popular or scientific; whether it deals in careful reasoning or free fancy. Also, I want the review to be brief. It would be very pleasant if it were readable, but that is a good deal to ask.

I fear brevity is much discouraged by the practice of paying by space. It is not the easiest thing in the world to combine brevity with pungency. While it may often be possible to improve a 500-word review by cutting it down to 250, it is sure to cost study. This study is not likely to be given if the result is to cut the payment for the work in half. To regard a shorter review as less work than a longer one is sound only if they are of the same degree of condensation and pithiness. One solution might be to pay "from *a* to *b* cents" per word for pithy, average, and diffuse reviews. The editor would have to class each review and assign the price accordingly. Writers would have an incentive then to condensed statement that they do not have now. The editor would have the burden of classifying reviews, but it would be fruitful labor. At present there is some incentive to diffuseness. Mark Jefferson.

Geographical Periodicals and the War. On account of the war, the September number of the *Geographische Zeitschrift* was combined with the October number. Notice was printed that the concluding numbers of the present volume would largely be devoted to political and military geography.

The *Deutsche Alpenzeitung* is appearing regularly, but is reduced to about half its usual number of pages.

The Ideal Aim of Geography. In an editorial dealing with the geographer's attitude to the European War, Professor A. J. Herbertson, in the last number of the *Geographical Teacher* (No. 40, Vol. 7, Part 6, Autumn, 1914, p. 358), felicitously refers as follows to the broader aspect of our work:

"As geographers it is our business to discover, describe and explain regional characteristics; it is our privilege to awaken regional consciousness which respects its own traditions and characteristics; and it is our duty to cultivate regional conscientiousness which, while doing all it can for the development of itself, respects the rights of other regions, and knows that, by mutual understanding and cooperation in construction with other regions, and not by hatred and attempts at their destruction, can any sound progress be accomplished."

Climatic Data for Health Resorts. The usual climatic data, it is agreed, do not, in all respects, supply the needs of medical men who are seeking the most complete and helpful information for the use of invalids. We need temperature observations for other hours than the usual two (or three) a day. We need data regarding the diurnal variability of temperature. A new instrument has lately been constructed, known as the homoötherm, which may be used for determining the loss of heat due to wind, and this will give us much needed data of direct physiological importance. Readings of wet-bulb thermometers as well as of dry-bulb thermometers should be noted, for the former give some indication of the sensible temperatures. Sunshine data are far from satisfactory, but the mean daily duration is more useful than information regarding the total number of hours of sunshine. Good fog observations are seriously lacking, and the usual data are misleading. The time of occurrence of fog is of great importance from the standpoint of health. Many other suggestions, all directed towards a revision of our list of standard meteorological data, if these are to be of the greatest value to medical men, are contained in a recent paper by von Hann ("Die klimatischen Faktoren vom balneologischen Standpunkte, und allgemeine Übersicht über die klimatischen Bezirke Oesterreichs." *Oesterr. Baederbuch,* 1914). R. DEC. WARD.

PERSONAL

The Geographical Society of Chicago has awarded its gold medal to Colonel George W. Goethals. It was presented to him at a dinner which the Society gave on January 23.

Nature reports that Professor T. A. Jaggar, formerly of Harvard University and now director of the Hawaiian Volcano Observatory, and a number of his assistants came near losing their lives while recently ascending Mauna Loa. The volcano was active at the time and was discharging large quantities of lava. The party, while ascending the mountain to study the eruption, was caught in a snowstorm, and snow slides nearly carried them into the path of the lava streams.

Dr. and Mrs. Workman were elected Honorary Members of the American Alpine Club after its special meeting at Philadelphia on May 2.

OBITUARY

JOHN MUIR. Mr. Muir, naturalist, geologist, explorer, died at Los Angeles, Cal., on December 24, of pneumonia, aged seventy-six years. While still a child, his family removed from Scotland to Wisconsin, where they opened a farm in the pioneering days. The boy grew up a great lover of study and of nature. He worked his way through the young University of Wisconsin. In early manhood the state of his health induced him to seek the more favorable climate of California, where he took to the study of nature, which became his absorbing passion. Earning, from time to time, the little money his few wants required, he lived among the mountains and the glaciers. He made a special study of glaciers and of the geology and botany of the Sierra Nevadas. He

was the first to assert the glacial formation of the Yosemite region. In 1881 he was a member of the Corwin expedition in search of the DeLong Arctic expedition, and improved the opportunity to make glacial studies on parts of the Siberian coast. He discovered the great glacier of Alaska which bears his name. Later he became active in the national park projects and the establishment of forest reserves, and fought stoutly for them. He was one of the best writers on the big trees of California, and, in 1903-4, he made studies of forests in Russia, Siberia, India, the Philippines, Australia and New Zealand. Later he traveled extensively in South America, giving especial attention to its forests. He was a fascinating writer, chiefly, however, for magazines and newspapers, on the physiography and natural history of the Pacific coast, Alaska, etc.

William Woodville Rockhill. Mr. Rockhill died at Honolulu, in December, of heart disease. He was sixty years old. His home address was at Litchfield, Conn. Since 1884 he had been almost continuously in the diplomatic service of his country, in China, Korea, and several other countries. He was our Minister to China in 1905-9, Ambassador to Russia in 1909-11 and to Turkey in 1911-13. He was best known in the scientific world for his explorations. While a member of the U. S. Legation at Peking in 1884 he began the study of the Tibetan language with a view to exploration in Tibet. In 1888 he started from Peking and crossed over into Tibet early in the following year. Though he was defeated in his effort to reach Lhasa, he made a long journey through unknown territory, which he described in his "Land of the Lamas" (1891). He made a second great journey, which he described in his "Diary of a Journey through Mongolia and Tibet in 1891 and 1892." This journey, which lasted eleven months, especially gave him distinction as an explorer, and his book describing it is counted among the important works on Central Asia. The Daly Medal of the American Geographical Society was awarded to Mr. Rockhill in April, 1909, "in consideration of the scientific value of his two journeys of exploration in China, Mongolia and Tibet during the years 1888 to 1892, and in further consideration of the value of his numerous additions to the geographical nomenclature of Tibet, his knowledge of Eastern languages, and writings on Oriental subjects." He also received the highest honors of some of the European countries.

Mr. Rockhill spoke the Chinese language with great facility and was one of the leading authorities on Chinese matters. When he was taken ill he was on his way to Peking, where he had been appointed adviser to President Yuan-Shi-kai. He was removed from the steamer at Honolulu and died in the hospital.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch)

EUROPE

Greater Rome and Greater Britain. By Sir C. P. Lucas. 184 pp. Index. Clarendon Press, Oxford, 1912. 3s. 6d. 9 x 6.

Unique is the word which seems best to characterize this book. In brief, as stated by the author, "this book is intended to illustrate, by comparison with the Roman Empire, some features of the British Empire . . . ." It is a story of the effect of science upon the progress of nations, with particular reference, of course, to the two empires mentioned. Geographic phenomena play a most significant rôle.

The author's point of view is stated in part on p. 54 in the following words: "It may be laid down in general that over and above communication, the main empire work of science is to make habitable places more habitable and unhabitable places habitable." He then proceeds to find the natural causes that lend to the growth and strength of the Roman Empire and to compare these with the events that lend to the building of the British Empire. After comparing the respective periods of continuity, he endeavors to throw light upon the present status of the British Empire and to forecast its future.

The breadth of the point of view is indicated on page 167, where he challenges the statements so frequently made that tend to demonstrate how one cause alone has predominated in the upbuilding or breaking down of an empire: "What holds the empire together and what will hold it, if it is held, is an aggregate of considerations . . . none of which will hold the field exclusively." The book is filled with statements rich in meaning and is further enhanced by the fact that an Englishman who seems well versed in his subject has written it.

EUGENE VAN CLEEF.

Histoire de l'expansion coloniale des peuples européens. Néerlande et Danemark (xviie et xviiie siècles). Par Charles de Lannoy et Herman Vander Linden. vi and 487 pp. Maps. Henri Lamertin. Brussels, 1911. 9½ x 6.

Several years ago these distinguished demographers wrote on the colonial expansion of Spain and Portugal. In this second contribution to an important series, Prof. De Lannoy monographs the colonial system of the Netherlands and Prof. Vander Linden deals with the expansion of Denmark overseas. It is appropriate that these two countries are thus brought into association, for their colonial systems are strongly interrelated at home and abroad.

In this volume the authors are critical historians of a great epoch. They have sought out, with unflagging zeal, the motive which led men from familiar scenes to the conquest and the remaking of new lands. It is a brilliant theme of study and it is excellently handled.

The colonial history of Holland is familiar, its course is accessible in many volumes of state papers. But the Danish colonies are in far other case. How different is made manifest in the bibliography: that of the Netherlands, cited in this volume, fills fifteen pages; Denmark needs but two. In fact, Prof. Vander Linden's present monograph is not only the first authoritative history of the subject but is in effect the initial presentation in any form. Those who

have seen the Danish West Indies will feel no surprise that Denmark's colonial system should have lacked history. History must be the record of events. Where nothing has ever happened, where nothing ever can happen, there can never be history.

The English Peasantry and the Enclosure of Common Fields. By Gilbert Slater. Series: Studies in Economics and Political Science. vii and 337 pp. Ills., index. London School of Economics. A. Constable & Co., London, 1907. 10s. 6d. 9 x 6.

A minute and detailed study of the British peasant land tenure in common and the effect of doing away with it. The standpoint is that of the modern historical investigator who seeks to find truth at all costs. The origin of the common field system and of the British village community is not investigated. However, the hypothesis is adopted that the local type of village community in the tenth century was a result of the blending of the racial traditions of the successive elements of the population, Celt, Saxon, Angle, Dane and Norman. It is shown that, even in recent times, the enclosure of common fields has made of the peasant, endowed with medieval rights and privileges, a laborer wholly dependent on weekly wages. A brief chapter on the common fields of New England, as found in the towns of Plymouth, Sandwich and Salem, Mass., throws considerable light on the type of village previously existent in the eastern counties of England. The result of enclosing common fields is shown to be increased production of commodities and national resources, increase of pauperism and intemperance, increase of the quantity of human life at the expense of degrading its quality. DAVID H. BUEL.

English Historical Literature in the Fifteenth Century. With an appendix of chronicles and historical pieces hitherto for the most part unprinted. By Charles L. Kingsford. xvi and 429 pp. Index. Oxford Univ. Press, Amer. Branch, New York, 1913. 15s. 9 x 6.

A scholarly and critical examination of the sources of the history of England in the fifteenth century. It shows how the monastic Latin annals were developed into English historical writing of the modern type. The whole cycle of writings reviewed centers on Henry V and his campaigns and Wars of the Roses between the houses of Lancaster and York. To the casual reader, the more interesting portions of the work are the critique of the "History of King Richard III," attributed to Thomas More, the English chronicle, and the Paston letters. It is maintained that the "History of Richard III" is the first English history which is not a mere collection of facts, but a deliberately designed and carefully finished whole, from which our art of history must date its beginning, and which was the most notable expression of the spirit of the age. The use which the later chroniclers—Hall, Stow, and Holinshed—made of these sources is carefully traced and the subject-matter which they furnished for the Shakespearian historical plays. DAVID H. BUEL.

A History of the Commercial and Financial Relations between England and Ireland from the Period of the Restoration. By Alice E. Murray. Series: Studies in Economics and Political Science. 486 pp. Index. School of Economics, London, 1903. 10s. 6d. 9 x 6.

This volume is the result of the author's investigations while she was a research student in the London School of Economics. It is a critical study of the economic policy of the British government since the period of the Restoration, in so far as this policy has affected Ireland. The work is based upon the available books and documents, as well as upon manuscript sources, and it is characterized by such painstaking effort and scholarly merit that it has been endorsed by some of the leading authorities within the field which it occupies.

A new phase of English commercial policy was initiated about the time of the Restoration. Until then, legislation respecting trade affected England and Ireland alike. But the Navigation Act of 1663 was the beginning of a restrictive policy toward the industries and trade of Ireland, and this policy remained in force for over a century. The writer attempts to show in how far the commercial legislation of England affected the economic development of Ireland—

throwing the masses of the people on the land, and thereby influencing the agrarian trouble. It is pointed out that the commercial policy and the penal laws "cause a grievous deterioration of the national character, to which even the present poverty and backwardness of Ireland may be traced." The conclusion is, however, that, from the standpoint of economic development, brighter days are in store for Ireland, and that this country has a prospect of sharing, in the future, in the general material progress of the age. AVARD L. BISHOP.

Prehistoric Britain. By Robert Munro. Series: Home Univ. Library. 256 pp. Ills., index. H. Holt & Co., New York, 1914 (?). 7 x 4½.

The author briefly treats of geology, fauna, and flora before taking up the relics of prehistoric man. The types of paleolithic man, his culture and civilization, as disclosed by their tools, weapons, ornaments, etc., are described. The industrial remains of Paleolithic Britain are classified according to Gabriel de Mortillet's system—that is, in chronological sequence, according to the degree of culture disclosed by the relics found at certain stations which Mortillet regarded as typical. The Neolithic Age is treated in the same manner. The work closes with a chapter on British ethnology. There are numerous sketches of the remains of the peoples described, their weapons, ornaments, etc. WILBUR GREELEY BURROUGHS.

Die Verdrängung der Laubwälder durch die Nadelwälder in Deutschland. Von Hans B. Jacobi. viii and 187 pp. H. Laupp, Tübingen, 1912. Mk. 6. 10½ x 7½.

The book discusses the extent, causes, and effects of the increasing substitution by conifers, especially firs, of deciduous trees in the forests of Germany. While in the primeval forests two-thirds were deciduous and one-third only pine forests, the proportion is reversed in the forests of to-day. This decrease of the deciduous woods is due partly to the progress of civilization, because—as in the case of the "oak groves" in the Middle West—the occurrence of oak and beach was a characteristic of good soil, so that these woods were cleared for agricultural purposes to a much larger extent than were the pine woods. The reclamation of swamps and the general regulation of drainage conditions for agricultural purposes have in many places bereft the soil of the amount of moisture which is required by the deciduous trees, while conifers thrive on a drier soil.

The unscientific methods of exploiting the woods, which were common in former generations, also added not only to the decrease of the woods but also to the improvement of the soil; so that, when rational forestry began in the last century, the reforesting of the lost area was possible only with fir and pine in most places. Commercial considerations contributed not a little to hasten the process. In proportion as the demand for marketable lumber increased, the culture of the fir, with its shorter periods of growth, became most profitable, and large tracts of former beech and oak forests were planted with fir or pine, which throve most encouragingly in the superior soil. It has seemed lately, however, that it is a question whether the lasting results of the change will prove as profitable; because in many cases the second crop of lumber on the new soil has been found inferior to the first, and, moreover, these artificial fir districts are much more easily affected by pests than the same woods grown on their home soils.

The book will furnish food for thought to all interested in the problems of forestry. The American reader may find comfort in hoping that, considering the thoughtless waste which even Germany practiced with her forests in former generations, the natural resources of his country, too, may still be rescued from exhaustion by means of scientific forestry wisely applied. M. K. GENTHE.

Die Entwickelung der Kartographie Südbadens im 16. und 17. Jahrhundert. Von Dr. Johannes Werner. 63 pp. Maps. *Abhandl. zur badischen Landeskunde,* Heft 1. G. Braunsche, Karlsruhe, 1913. Mk. 3.20. 9½ x 6½.

Twenty-one maps of southern Baden from 1503 to 1718 are here reproduced in part and described in very German detail, pointing out manner of drawing,

scale, map net, which is always absent, and the errors which are always there; thus the work is a list of descriptions which will enable the student who has not access to the originals in the University of Freiburg or the archives at Karlsruhe to become intimately acquainted with the mapping of that period.

With distinct general progress many of the mapmakers failed to profit either by the errors or the successes of their predecessors, just as happens to-day. A good many of the earlier maps are as difficult for the modern eye to decipher as a strange tongue. They do not speak to us. Yet the Ptolemy of 1513, if impressionistic and without accurate placing of parts, does speak to moderns, and the map of 1718 is essentially a modern one.

MARK JEFFERSON.

Geschichte der Deutschen Kolonialpolitik. Von Alfred Zimmermann. xvi and 336 pp. Index. Mittler & Sohn, Berlin, 1914. Mk. 7. 9 x 6½.

The colonial policy of Germany differs from that of most other countries in so far as it was not inaugurated by the government, nor even looked upon by it favorably at the beginning, but rather grew out of a popular movement which encouraged the initiative of a few enterprising individuals. Even so, it might have shown much more satisfactory results but for the inconsistency which the government showed in dealing with colonial problems until long after it had officially declared itself in favor of colonial expansion.

Zimmermann's book tells all about the ups and downs of that colonial movement, from its beginnings to the present status of the colonies. The desire for colonies in the German nation is older than the German Empire. It began to make itself felt first in the forties of the last century, when the heavy emigration from Germany threatened to become a dangerous drain on the nation. All kinds of schemes were proposed to find new land for this surplus of population, in many cases by bankrupt speculators in foreign countries, who hoped to attract German labor and capital to their enterprises, but partly also by serious economists and geographers. As early as 1866 the German explorer Breuner had found the Sultan of Witu desirous to place himself under the protection of Prussia against his arch-enemy, the Sultan of Zanzibar. Nothing came of it, however, nor of any of the numerous other suggestions, because Bismarck, whose whole interest was then concentrated upon the consolidation of the German States in Europe, did not judge it wise to enter, at the same time, upon foreign enterprises which might entangle Prussia into conflicts with other powers. While, no doubt, he was right in this, it was most unlucky that the existing conditions did not allow Germany to act at that time; for this discrepancy between the aspirations of the nation and its lack of power to realize them wrought lasting damage to all its future colonial possibilities. The lively discussion of these schemes in the German press attracted the attention of other nations, especially the English, to the foreign lands still available for colonization, and thus, by a strange irony of fate, the endeavors of those German patriots served but to strengthen the rival powers.

Even after the foundation of the German Empire, it was a long while before the colonial question received its due share of attention. For more than ten years after 1871 German business men and trading companies continued to carry on their work in foreign countries without the support or protection of their flag. On several occasions, when the question of granting subsidies to one or the other company was brought before the Diet, because the eventual failure of such a company would have meant a loss of great opportunities for the German trade in general, the Diet refused to vote the necessary funds. It was on one of those occasions that Bismarck spoke these memorable words: "The first requirement for the establishment of colonies is a mother country in which patriotism is stronger than partisan spirit." In 1882, a German colonial society was founded. It could not do much practical work under the circumstances, but it carried on a lively propaganda for the colonial idea, which helped to destroy part of the prejudice against it in parliamentary circles.

Before long the course of events showed the necessity of colonial expansion, not so much from the national point of view, which its older advocates had emphasized, as for economic and commercial reasons.

The new era of discovery which had set in about the middle of the last century had thrown light on vast areas still untouched by colonization. The

news acted as a stimulus to reawaken in all the older colonial powers the spirit of colonial expansion which had long been dormant. The increasing exploration of Africa (in 1881 alone there were 45 expeditions at work there!) had shown to what a surprising extent German trade and capital were engaged in that continent. Some very unpleasant experiences of German firms in foreign colonies had graphically illustrated the helplessness of the trader when not protected by his own flag. All this combined to somewhat modify the attitude of Bismarck and that of the Diet. While still declaring that Germany was not in a position to found and maintain regular colonies, he was willing to grant charters to certain companies, which would place them under the official protection of the Empire, while they would still carry on the whole work at their own risk. Thus the German flag was hoisted in Africa for the first time in 1884 at Angra Pequeña, on the southwest coast of Africa, by the Bremen merchant A. E. Lüderitz. But very soon this firm proved financially unable to fulfil the obligations imposed by its charter; the Empire found itself obliged to take a hand in the matter after all, so that in 1885 the first official colony was established at Angra Pequeña.

The ice having once been broken, other colonies soon followed: in Kamerun, Togo, Southwest Africa, East Africa, and the South Sea. It is very interesting, in following up this development, to observe how, at almost every step forward, Germany knocked against some obstacle placed in her way by England, and how the course of events forced upon the Empire a change from the former, merely protective policy toward the organization of regular colonial governments and a Colonial Office. This is the first book in which that story has been told in full, and it makes interesting and instructive reading for anybody interested in colonial problems. A chronological list of the higher officers of the German colonial service, and a tabulated synopsis of the principal events in the history of the colonies, from the first beginnings to the present, make the book especially handy for all kinds of reference on the subject. M. K. GENTHE.

Changing Russia. By Stephen Graham. 309 pp. Ills., index. John Lane Co., New York, 1913. 8½ x 6.

In common with an earlier book by the same author, in which he depicted the life of the Russian pilgrim to the sacred shrines, we feel sure that the chief appeal of these works will lie in the skill with which the story is told. Mr. Graham prefers the paths which lead him nearest to the Russian of the soil rather than the superficial education of the towns. He has ripe sympathy for the Russians whom he knows, a people of great possibilities, with the virtues and, equally, the vices of immaturity. He foregathers with the village pope of the "mir," with the tramp upon the byway, with the sailor deserting his ship and the soldier on furlough from the colors, and with the student at the university. From each he receives such hospitality as chance affords. He avoids the strongly Teutonized Russia of the upper and administrative classes; he selects as the more interesting the unmixed Russian of the "mir," and shows himself appreciative of the persisting differences which characterize the Russians of Great Russia, of White Russia, of Little Russia—differences which we too little recognize, yet which are more sharply drawn than any regional diversities in our own community. These volumes are sketches threaded along a strand of geographical purpose, but each sketch is a contribution toward the better comprehension of the great mass of the Russian community.

WILLIAM CHURCHILL.

Modern Russia. By Gregor Alexinsky. Translated by Bernard Miall. 361 pp. Index. T. Fisher Unwin, London, 1913. 9 x 6.

The most interesting thread which is woven through this tissue of the affairs of Russia is the attitude of the writer. He is proud of the history of his great land in its brighter spots, he is hopeful for a future which he is laboring to advance. But in the present he seems bewildered; he finds it difficult to see how the logic of life will bring into existence a future sharing in the progress of occidental Europe. The march of his narrative is impeded by the necessity of explaining away the mass of western error. For a long time to come this must be the first task of any historian of Russia. So many writers have seized upon the picturesque rather than the vital that, in the west, there exists only a

melodramatic Russia which moves through the Third Section, the bomb of the Nihilist, the black smudge of the censor, and, back of it all, the knout.

When these stage properties are taken away there remains a most interesting nation struggling out of a life which passed from England four centuries ago, a nation charged with the inert conservatism of ignorance—rather, a group of diverse nations yet to be fused into a strong nationality. A small group of educated men and women strives with passionate earnestness to quicken this sullen lump into new life. In this group Alexinsky has been among the leaders; therefore it is very interesting to read his interpretation of the movements in whose motion he shared. WILLIAM CHURCHILL.

Histoire de la Russie depuis les origines jusqu'à nos jours. Par Alfred Rambaud. 6e édit. Revue et complétée jusqu'en 1913. Par É. Haumant. 963 pp. Hachette & Cie., Paris, 1914. Fr. 6. 7½ x 4½.

A posthumous edition of this well-known work on Russia, crowned by the French Academy. Setting out with an account of the geography and ethnography of Russia, it goes on to relate the primitive, idolatrous religion of the Slavs, the formation of the Russian nation, the conversion of the people to the orthodox faith, the reigns of the Czars from Ivan the Great to Nicholas II. The final chapter, on Russia from 1900 to 1913, will prove of most interest, as dealing with recent events, such as the war with Japan, the revolution of 1901, and the opening of the Duma, the *entente* with England, the Russian attitude to the Balkan question, and the actual state of Russia to-day. The account of the rise and spread of Nihilism, and the causes which favored it, is unusually good, but does not extend beyond the assassination of Alexander II in 1881. The intricate intrigue, treachery, and double-dealing of the police spy Azeff do not find mention. There is an extended bibliography, but no index.

DAVID H. BUEL.

Old World Memories. By Edward L. Temple. 325 and 347 pp. Ills., index. The Page Co., Boston, 1914. 7½ x 5½.

It must require courage to attempt a record of one's own impressions of the ordinary European tour in face of the inevitable comparison with so many previous similar efforts and with the well-known Baedeker. However, this effort is well up to the average of such works. It is written attractively and records quite a number of historical and antiquarian allusions, useful, if not novel. In the two volumes in one, three of the twelve chapters of the first volume concern England, while the whole of the second volume is taken up with it. Among the excellent half-tone reproductions of well-known works of art are Leonardo da Vinci's "Mona Lisa," Murillo's "Immaculate Conception," and Correggio's "Mercury Instructing Cupid." Among the architectural masterpieces are reproduced the cathedrals of Cologne, Canterbury, Durham, Oxford, Winchester, Chester, Carlisle, and Salisbury, the Louvre, Fontainebleau, the British Parliament houses, and Windsor Castle. Letter press, paper and binding are all that could be desired, and a complete index is added.

DAVID H. BUEL.

Hannibal Once More. By Douglas W. Freshfield. 120 pp. Maps, ills. E. Arnold, London, 1914. 9 x 5½.

A monograph on a moot point of classical military geography, the route by which Hannibal led his army over the Alps into Italy. The pass favored is the one nearest to the seacoast road, known as the Vars-Argentière. All the expert geographical knowledge and Alpine experience, as well as the common sense of the writer, are brought to bear on the classical texts of Varro, Polybius, and Livy, upon which any theory of Hannibal's route must rest. The view of Commander Colin and Professor Spencer Wilkinson, that Hannibal used the Col du Clapier, a lofty and difficult pass of Mont Cenis, is ably combated. DAVID H. BUEL.

Die Austiefung des Rheindurchbruchtals während der Eiszeit. Von C. Mordziol. (Die Rheinlande in naturwissenschaftlich-geographischen Einzeldarstellungen, No. 1.) 43 pp. Maps, ills. Westermann, Braunschweig, 1912. Mk. 1. 8½ x 6.

An admirable little pamphlet, the first of a series to be published in con-

nection with the Rhenish Museum at Coblenz. It has a few good pictures, three admirable and beautifully executed little maps, and gives an excellent account of the wearing of the Rhine gorge—Bingen to Bonn—by the river, all this in popular language and in a pleasing style. The valley has been in about the same place since Tertiary time. The relation of the older terraces to the present river flood plains is clearly described, as well as the upfolding of the Schiefergebirge by which the erosion of the gorge was caused. The relation of the various terraces to the glacial epoch and its stages is made out and a word given to the loess. Surely thoughtful visitors to the Rhine country will appreciate this excellent volume. MARK JEFFERSON.

POLAR

National Antarctic Expedition, 1901–1904. Physical Observations, with discussions by various authors. 192 pp. Map, ills., index. Royal Soc., London, 1908. 12 x 9½.

While elaborate and expensive final reports upon an important expedition are essential to the preservation of its full data, the time required for their preparation and publication is such that the more important general facts and conclusions have long since found their way to the scientific public. The lack of interest which they offer on this account is further increased by the "dry" aspect of pages of tables to each paragraph of summary.

Without reflecting in any way upon the value of this report, it offers little that is new, with the exception of a number of plates showing auroras and new views about the winter quarters of the expedition. The report is in five sections—namely, tidal observations in the Antarctic regions, 1902-1903; pendulum observations; earthquakes and other earth movements recorded in the Antarctic region, 1902-1903; Antarctic observations of aurora, 1902-1903, and Antarctic magnetic observations, 1902-1904. The writers of these reports include authorities of the first rank—namely, the late Sir George Darwin, Dr. C. Chree, Mr. L. C. Bernacchi, and the late Dr. John Milne. The value of gravity derived from pendulum observations at the winter quarters on McMurdo Sound is 982.985 (theoretical sea-level value, 982.963), as against 979.970 (theoretical sea-level value, 979.954) obtained at Melbourne, Australia. The interesting results of seismograph observations have already been published by Milne in other papers. W. H. HOBBS.

National Antarctic Expedition, 1901–1904. Meteorology. Part 2: Comprising daily synchronous charts, 1st October, 1901, to 31st March, 1904. Prepared in the Meteorol. Office, under the superintendence of M. W. Campbell Hepworth. 26 pp. of text. Royal Soc., London, 1913. 12 x 9½.

The publication of the physical results of the British National Antarctic Expedition of 1901-1904, for which the Royal Society undertook the responsibility, is completed in the present volume on Meteorology, Part II (Part I was issued in 1908). The results here included were obtained during the expeditions of the *Discovery*, *Gauss*, *Scotia*, and *Antarctic*, as well as on other vessels in the southern oceans, and at observatories in the southern portions of the southern continents. We have here, for the first time, a series of daily synoptic weather maps for the southern hemisphere, south of latitude 30° S. The period covered is Oct. 1, 1901–March 31, 1904. The charts are for Greenwich mean noon; they are printed four to a page, show isobars for each tenth of an inch, winds and temperatures, and number over 1,000 in all. Monthly summary charts are also included. The total number of observations charted was 44,893. The text, by Captain Hepworth, discusses certain conclusions as to the origin and direction of travel of the cyclones of the southern oceans, and calls attention to certain salient features shown on the charts. This body of material is obviously of immense importance, incomplete as the charts inevitably are, for we now have the opportunity to follow out, day by day, the movements of the far southern cyclones and anticyclones.

No one can turn over the pages of this important volume without being impressed by the enormous labor involved in its preparation, and without a feeling of gratitude to all the faithful observers who, often in peril and usually

in discomfort, made the series of records which are here collected and summarized so that all of us may make use of them, quietly, conveniently and in safety, in the study, the library, or the classroom. R. DEC. WARD.

Ein arktischer Robinson. Von Kapitän Mikkelsen. 2. Auflage. x and 384 pp. Maps, ills., index. F. A. Brockhaus, Leipzig, 1914. Mk. 10. 9 x 6½.

The English edition of this noteworthy book was reviewed at length in the *Bulletin* (November, 1913, p. 862). The Danish edition is also in the library.

Hunting in the Arctic and Alaska. By E. Marshall Scull. 304 pp. Maps, ills., index. John C. Winston Co., Philadelphia, 1914. $2.50. 9 x 6.

This book is the usual narrative of animals slaughtered or left to die. Killing wild creatures as they went, Scull's party made, in all, a summer cruise down the Yukon River, through Bering Strait to Herald Island and northeastern Siberia and by Bering Sea to the Alaska and Kenai peninsulas. There are 136 illustrations from photographs and 11 maps, which are excellent. WILBUR GREELEY BURROUGHS.

Das Nordland. Von Carl Lausberg. xxiii and 603 pp. Map, ills., index. Klinkhardt & Biermann, Leipzig, 1913. Mk. 14. 10 x 6½.

The author describes a trip to Norway and Spitzbergen, illustrating the written word with many beautiful pictures and half-tones. Yet the book is more than a mere narrative of "voyage und travel." Not satisfied with merely seeing sights, the author had prepared himself for the trip by a thorough study of the geography and history of the countries to be visited, and he presents us with the results of these studies in a very readable form, such as the geological history of Scandinavia and of Spitzbergen, the Gulf Stream drift and its influence on the climate of northwestern Europe, the commerce and traffic, political constitution, education and religion of Norway, Norwegian language, literature, art, and music, a short history of Norway, observations and reflections on the character of the Norwegian and his ward, the Lap—in short, the book contains about everything which the prospective tourist ought to know about the country which he intends to visit; and it has the merit of presenting the subject in such an attractive way that it cannot fail to please also the reader who takes it up for its own sake. M. K. GENTHE.

My Life with the Eskimo. By V. Stefánsson. ix and 538 pp. Maps, ills., index. The Macmillan Co., New York, 1913. $4. 9 x 6.

"Uninhabited" was written in red letters across the face of the map of Victoria Island by the Canadian Government in 1906. Whether this assertion was true or false was to be proved within the next few years by Vilhjalmur Stefánsson.

While still north of the Arctic Circle in 1906-1907, on his first expedition, Mr. Stefánsson was formulating plans for a second expedition. On returning to the United States, he laid these plans before the American Museum of Natural History. The idea was, to quote the author, that "it seemed possible that there might exist on the north shore of America, and possibly on Banks Island and Victoria Island, people who had not seen a white man, either they or their ancestors; and there, almost certainly, were other people who themselves had not seen white men, although the ancestors of some of them might have been explorers of Franklin's own party or else men of the Franklin Search."

Mr. Stefánsson proposed to prove the existence or non-existence of such a people by thorough exploration. The Museum authorities were interested, but funds were not available to buy a ship and the customary outfit of Arctic exploration. This, however, did not deter Stefánsson. He writes:

"Our thesis was this: that we were not looking for any waste places, but for land occupied by human beings; if those human beings were there at all, they must be Eskimo supporting themselves by the most primitive implements of the chase; and if Eskimo could live there, armed as they must be with bows and arrows, and not only live but bring up their children and take care of their aged, then surely we, armed with modern rifles, would be able to live in that sort of country as long as we pleased and to go about in it as we liked."

So on April 22, 1908, Stefánsson left New York bound for the North. At Toronto he was joined by Dr. R. M. Anderson. The route was by way of the Athabaska, Slave, and Mackenzie Rivers and Mackenzie Bay to Herschel Island, Yukon Territory, Canada.

The work of exploration continued until Nov. 1, 1912. Much of the time Stefánsson and Anderson were separated and, accompanied by Eskimo, did individual research. Success attended their endeavors. Many inaccuracies of the maps, as well as the false impressions of earlier explorers, were corrected. The *Bulletin* has already told of the importance of the Horton River, the "Blonde Eskimo" and other contributions made by Stefánsson on this expedition to our knowledge of the American Arctic. They are all graphically recorded in this book.

The work is illustrated with numerous photographs taken by the author. There are also two excellent maps showing the regions explored. The book is of great value and is likely to be, for a long time, the standard work on the Eskimo of that region. WILBUR GREELEY BURROUGHS.

WORLD AND PARTS OF IT

Latin America. By William R. Shepherd. Series: Home University Library of Modern Knowledge. viii and 256 pp. Map, index. Henry Holt & Co., New York, 1914. 50 cents. 7 x 4½.

The author begins at the very root of the Latin-American question, considering the original colonies of Latin America and the history of the countries to the present time. A chapter is given to the independence of the republics, their national development, international relations, geography and resources, social characteristics, politics, finance, industry, commerce, transportation, education, charity, science, arts, etc. In the subjects considered, the underlying reasons for their present status are shown. A clearer, deeper understanding of the Latin-American people thus is obtained than otherwise could be secured. And it is worth while for the business man of the United States to understand the Latin American, if the United States is to gain a hold on Latin American business. At present, in South America, British and German banking interests practically control the money market and make large profits on their operations. Many other opportunities await the business men of the United States. A bibliography and a map of Central and South America are included in the book. WILBUR GREELEY BURROUGHS.

Bewölkung und Sonnenschein des Mittelmeergebietes. Von Johannes Friedemann. 97 pp. Maps. *Archiv der Deutschen Seewarte,* Vol. 35, 1912, No. 2. Hamburg, 1913. Mk. 9. 11½ x 9.

Famed far and wide are the blue and sunny Mediterranean skies. As one writer has said, the problem of having the most abundant precipitation with the largest number of clear days has been solved on the southern slopes of the Alps. Yet, for this famous district, we have hitherto had no complete discussion of cloudiness and sunshine. Fischer and Philippson have already given us excellent general climatic accounts of the region, and now comes an important study of the cloudiness and sunshine by Johannes Friedemann. The author has diligently collected all available material, including observations made on vessels plying over the Mediterranean. Great care has been taken in the reductions. Colored charts are given showing the cloudiness and sunshine for the year, December, February, April, July and October, as well as the annual amplitude of cloudiness. A series of curves and a plate of isopleths are also included. It is a great addition to our available climatological literature on this interesting region to have this new and very complete study of cloudiness. Our only criticism concerns the selection of colors for the charts. These are too glaring and do not harmonize with one another. R. DEC. WARD.

Wind Charts of the Northernmost Part of the Atlantic and of Davis Strait. Constructed on the basis of observations belonging to the Danish Meteorological Institute. By V. Garde. [In Danish and English.] 22 pp. text. 8 charts. Copenhagen, 1900. 15 x 12.

A gap in our charted information concerning the meteorology of the North Atlantic Ocean and of Davis Strait has been filled by Captain Garde's wind

charts. The relative frequency (expressed in percentages) of the eight principal wind directions for the months April to October is shown by wind roses. The period of observation is the twenty years 1876-1895. The data are those recorded on board of vessels reporting to the Danish Meteorological Institute. In addition to the observations made at sea, wind roses are given for several coast stations. The mean wind directions, indicated by single arrows, are also shown on inset isobaric charts (reduced from Rung's larger charts). The text is both Danish and English. The information so clearly presented in this publication will prove very useful to those who are studying the wind movements over this somewhat neglected area, where, owing to the presence of the "Iceland Low," the wind circulation has a peculiar interest.

R. DEC. WARD.

The Waters of the Northeastern North Atlantic. Investigations made during the cruise of the *Frithjof*, of the Norwegian Royal Navy, in July 1910. By Fridtjof Nansen. 139 pp. Maps. Dr. W. Klinkhardt, Leipzig, 1913. 9½ x 6½.

A great stream, 1500 meters deep, travels along the eastern border of the North Atlantic all the way from the Spanish and African coasts, close under the continental slopes. A little surface water is blown upon it from the North Atlantic Drift, but an insignificant amount. The main mass has never been across the Atlantic and is driven north by differences of density due to temperature.

Most interesting is the method of study. Nansen has examined the temperature, salinity and density of the water at all depths on sections that have been made *across the current*. A stream deflected to the right by the earth's rotation must have its surface waters *thicker* on the right, i. e., the lines of equal density parting light surface water from heavier underwater, must descend across the current *to the right*. As this does happen *to the east* on all sections, the water is moving north. Confirmatory is Mediterranean water at 800 to 2000 meters all the way from Gibraltar to Ireland, recognizable by its warmth, though it is so heavy with salt it lies under the colder Atlantic water.

MARK JEFFERSON.

Meteorological Charts of the Southern Ocean between the Cape of Good Hope and New Zealand. 2nd edit. 10 pp. 36 charts. Meteorological Committee Offic. Copy No. 123. London, 1907. 6s. 9½ x 13.

The first edition of these excellent charts was issued in 1899. The observations used were from a large number of logs (all that were available) of British naval and merchant vessels for the period 1855-1895. The area covered is Lat. 30°-60° S. and Long. 10°-180° E. The charts show, for each month of the year, the wind direction and force, pressure, air and sea surface temperatures, fog, and ocean currents. The second edition was published in 1907. The scale of the wind, pressure, air and sea surface temperatures and fog charts has been reduced, while that of the ocean currents has been slightly increased. Further, the distribution of ice is now shown.

R. DEC. WARD.

Southern Hemisphere Surface-Air Circulation: Being a study of the mean monthly pressure amplitudes, the tracks of the Anticyclones and Cyclones, and the Meteorological Records of several Antarctic expeditions. By William J. S. Lockyer. iii and 110 pp. Maps, diagrams, index. Solar Physics Observatory. Eyre & Spottiswoode, Ltd., London, 1910. 6s. 12 x 10.

This memoir represents an immense amount of labor. Its purpose was to study the mechanism of the atmospheric circulation of the southern hemisphere. Dr. Lockyer took the daily records of the barometric readings for the months of April to September for fifty-seven stations and made diagrams showing the rise and fall of the barometer. For many of the stations different years were taken into consideration; therefore the total number of curves drawn and investigated was 164.

In order to determine the mean amplitude of the recorded lows and highs, the three largest amplitudes on each curve were selected, the mean was formed

and then the variations—less than one-fifth of this mean amplitude—were disregarded in the counting. The mean amplitudes thus obtained show that the lines of equal-pressure amplitude form circles with the South Pole as center.

These pressure amplitudes increase in value from a minimum near the equator, rise to a maximum at 60° S., and then decrease to the South Pole. The amplitude is 4mm. along the parallel of 20° S., 13mm. at 40°, 19mm. at 60° and 16mm. at 70°.

The regions where directions along the parallels of latitude are conspicuously departed from are in South America and South Africa where high land exists. The paths of the equi-amplitude lines over the land surfaces correspond with the directions of the forward movement of the anticyclones over these lands. The increase in amplitude from the equator to about latitude 34° corresponds to the approach of the belt in which the anticyclones move; the maximum along the 60th parallel is due to the cyclonic belt, and the decrease farther south is due to the approach to the South Polar anticyclonic area.

Dr. Lockyer measured the mean daily rate of displacement of the anticyclones and found about 12° in longitude for South Africa, 11°5′ for South Australia, and 1°7′ for South America. Over the southern ocean the daily displacement of the anticyclones is about 9°2′ in longitude. The mean velocity around the earth being approximately 10°7′ per day, the anticyclones complete the circuit in about 33.6 days. A diagram (Pl. XIV) shows the correlation of the cyclones of the cyclonic belt with the anticyclones of the high-pressure area of the temperate region.

Comparing Dr. Lockyer's system of the surface-air circulation with what we know about atmospheric circulation in the northern hemisphere, one is tempted to think that his theory is simply a speculation. However, the daily weather maps of Australia and the experience gained by the antarctic expeditions in the frozen South show, in a most convincing fashion, that Dr. Lockyer's researches and the results he obtained are of a far-reaching practical value. HENRYK ARCTOWSKI.

MATHEMATICAL GEOGRAPHY AND CARTOGRAPHY

The Effects of Errors in Surveying. By Henry Briggs. xi and 179 pp. Ills., index. C. Griffin & Co., Ltd., London, 1912. 8 x 5½.

This excellent little book, it is stated, is intended to investigate how errors combine in affecting the accuracy of surveys, in order that rules may be framed to help the surveyor to guard against error and methods devised to allow him to assess the error likely to occur in any given case in practice. After the introduction are five chapters headed, respectively, the analysis of error, the best shape of triangles, the propagation of error in traversing, the application of the methods of determining average error in traversing, and the propagation of error in minor triangulation. A final chapter summarizes the conclusions reached. The results of "Least Squares" are assumed, but the mathematical work involved in demonstrating the author's conclusions is given in full. The examples are such as occur in every-day practice with small instruments, rather than in geodetic work, thus making their application more general. The typography is excellent. JAMES GORDON STEESE.

Lehrbuch der Landesvermessung. Von E. Hegemann. [Part 1]: 261 pp. Part 2: 306 pp. Map, diagrams. P. Parey, Berlin, 1906, 1913. Mk. 12. and Mk. 13. 9 x 6.

An unexplained interval of seven years separates the appearance of Vol. II, Projections, Levels, and Topography, from Vol. I, Triangulation, of this Manual of National Surveys. The treatment is essentially mathematical, about two-thirds of the work consisting of formulæ and their development. Wherever appropriate, illustrative examples from the Prussian Survey are solved in detail.

Chapter 1, Taking the Measurements, occupies half of the first volume. It discusses the field work and methods of a primary triangulation survey. Much of it is of historical interest only, being a description of the methods and instruments employed at different times on the Prussian Survey, rather

than an exposition of the approved practice of the present day. The next six chapters discuss the reduction and adjustment of a triangulation system. There are presented, successively, the spherical trigonometry involved, a discussion of the earth ellipsoid, the solution of an individual triangle, the adjustment of a chain of triangles, discussions of the rectangular and geographical systems of coordinates, and the calculation of the geographical coordinates of a triangulation net. In Chapter 8 is given a summary of the Prussian net, accompanied by a map.

The first seven chapters of the second volume continue the mathematical discussion. There are presented, successively, the geodetic line, the normal form, mathematical formulæ, projection after Gauss, transverse coordinates, the conical projection of the sphere and the spheroid, and the general properties of a geodetic triangle. The remaining two chapters, which occupy less than one third of Vol. II, cover the determination of elevations and the filling in of the topography. JAMES GORDON STEESE.

Astronomy. By George F. Chambers. xxiii and 335 pp. Ills., index. D. Van Nostrand Co., New York, 1914. $1.50. 6½ x 4½.

The sixth work on astronomy by Mr. Chambers, who is, however, a lawyer—astronomy being his avocation. The book is for the many who would not make a serious study of astronomy, however impressed with the splendor of the heavens. This outline of leading facts will greatly assist such readers; and though they may possess only a smattering of scientific knowledge, it will answers many questions, stimulate intelligent interest, and help inquirers to use, with profit and enjoyment, a small telescope or even an opera glass. The volume, though small enough to carry in a coat pocket, is remarkably rich in helpful illustrations, most of which are not in general circulation. Mathematical matters are kept in the background. The work first treats of the scope of astronomical science, and discusses in the succeeding chapters the sun, moon, tides, climates, eclipses, comets, shooting stars, stars, groups of stars and nebulæ, the constellations, telescopes, time and its measurement, the spectroscope, and, in the appendices, statistics relating to planets and their satellites and a catalogue of celestial objects that may easily be studied through small telescopes.

GEOMORPHOLOGY

Principles of Stratigraphy. By A. W. Grabau. xxxii and 1150 pp. Ills., index. A. G. Seiler & Co., New York, 1913. $7.50. 9½ x 6.

Written for professional geologists and technical students, this massive treatise contains a large fund of valuable information, much of which had previously been difficult of access. The labor of collecting this material has evidently required years of painstaking endeavor, and the author himself has made important contributions from his own studies.

The introductory chapter supplies a general view of the facts and theories about the earth's divisions and general conditions, as well as a discussion of the several parts of geologic science. It is followed by seven large sections dealing with the atmosphere, hydrosphere, lithosphere, pyrosphere, centrosphere, biosphere and classification of geologic formations. Nearly half of the book is devoted to the lithosphere, but the hydrosphere and biosphere also receive extended treatment. The eight sections comprise thirty-two chapters, which deal with such topics as "The composition and physical character of the hydrosphere," "Classification of the rocks of the earth's crust," "Structural characters and lithogenesis of the marine hydroclastics." etc. Each chapter contains a description of conditions and sketches of the conclusions reached by the more important students of the respective fields. Most of the chapters on sedimentation include interesting comparisons of ancient and modern sediments, and each closes with a selected bibliography of the subject.

As the headings indicate, a wider field is surveyed than most stratigraphers would probably deem necessary under the caption of the book. The author has apparently thought it best to include a brief discussion of all phases of geology that ought to be a part of the mental equipment of a stratigrapher.

But in order to do this it was necesary to swell the volume to a thickness of nearly three inches, and even then it was not possible to give more than an elementary treatment of the many supernumerary topics, such as climate, rock metamorphism, biologic taxonomy, and evolution.

The table of contents shows that nearly half of the book deals with subjects which are not included in "stratigraphy" in the ordinary sense, although they have an important indirect bearing upon it. Practically all of these subjects have been as well and more elaborately set forth in various current treatises already familiar to geologists. Among these subjects are meteorology, physiography, vulcanism, and seismology. The introduction of lengthy, and yet in many instances inadequate, discussions of these subjects is not demanded except on the supposition that the student is to have access to no other geologic reference works. Some topics might well be omitted altogether, for there seems to be no vital need of a discussion of such things as the origin of the atmosphere, biologic taxonomy, and the condition of the earth's deep interior. If the author had held in check his evident desire to put into the book everything a stratigrapher ought to know, the price of the volume could have been kept within the reach of a much larger number of geologists, and the subject of sedimentation and others belonging to stratigraphy proper could have been more adequately discussed.

Even upon cursory inspection few readers of the book will fail to be impressed by the large number of unfamiliar technical terms which meet the eye. Some have been proposed by various European writers, but are not yet current even among stratigraphers; many are newly coined by the author. Some of the terms are really needed, because they express ideas which are otherwise only clumsily articulated. Thus "chronofauna" and locofauna" discriminate between the animal society of a geologic epoch or period and that of a certain district. Many of the new terms, however, are not really demanded, even though they have a certain appropriateness. Others, such as "phytology" for botany and "atmology" for meteorology, duplicate terms already of long standing and are therefore needless. Finally, the passion for providing a term for each pigeonhole in the author's elaborate classification results, for example, in the invention of the word "biometamorphism" to cover the trivial process of rock metamorphism through the action of organisms. On the whole, the book would be just as effective, and would be received more cordially by the geological fraternity, if most of the new terms had been left out.

The book is to be commended for its generally impartial treatment of unsettled questions in geology. Nevertheless, there are some important lapses from this good standard. Among several well-founded hypotheses to account for the anomalies of ancient climates only the picturesque "Pendulationstheorie" is considered; and contorted layers and "edgewise conglomerates" in limestones are ascribed to subaqeous gliding only.

A slightly different manifestation of the same tendency is observable in the many hasty or ill-considered statements apparently of opinions entertained by the author. Lack of space forbids illustration of them here, but nearly every geologist who examines the book will find instances which will tend seriously to weaken his confidence in the author's statements about less familiar subjects.

In extending his work over so broad a field it is humanly impossible for an author to avoid making occasional mistakes as to facts, and so it is not surprising that a few are to be found in almost every chapter of the "Principles of Stratigraphy." As is also but natural, not all of the manifold subjects in the book are equally well handled. The pages on rock metamorphism do not reveal a wide acquaintance or a clear understanding of that complex subject. On the other hand, the chapters on the "biosphere" and sedimentation are generally good.

The numerous illustrations, although chiefly woodcuts and line drawings, serve their purpose sufficiently. It is regrettable that the index is not more nearly commensurate with the size of the volume. It lacks reference to some important things, which, nevertheless, the reader may stumble upon somewhere in the text. Thus, neither *chert* nor *marl* is mentioned in the index, and for a discussion of *mud cracks* the reader is referred to a casual mention on page 512, although the subject is fully treated on pages 709 to 711.

In general, Mr. Grabau's book assists in putting the science of stratigraphy upon a modern basis, with its principles as definite and well classified as those of physiography and other branches of geology. ELIOT BLACKWELDER.

METEOROLOGY AND CLIMATOLOGY

Das Problem der Klimaänderung in geschichtlicher Zeit. Von L. Berg. (*Geogr. Abhandl.* Herausgegeben von A. Penck. Vol. 10, No. 2.) 70 pp. B. G. Teubner, Leipzig, 1914. Mk. 3.60. 10 x 7.

Those who have been trying to keep abreast of the current literature on changes of climate within historic times will find themselves greatly indebted to Dr. Berg, who has made an excellent digest of this scattered material. The earlier pages deal with certain theoretical considerations which relate to the desiccation hypothesis. A critical examination is made of the evidence of climatic oscillations or changes which is provided by rivers, lakes, deserts, soil and vegetation. Finally, the author turns to the individual countries from which evidence of desiccation has been brought forward and shows what conclusions should, in his judgment, be drawn from the facts. The discussion is pointed, clear, and interesting. Dr. Berg's conclusions are stated in no uncertain terms. From glacial times to the present there is almost everywhere evidence of a decrease in the waters of lakes and rivers, and in precipitation. A warmer and drier climate preceded the present epoch. Within historic times there does not appear to have been anywhere a progressive change of climate to a warmer and drier one. Climate is either steady (except for oscillations, whose period is at most a few decades, like the Brückner period), or there is even a tendency toward increasing moisture. R. DEC. WARD.

Traité de Météorologie. Par J. Vincent. viii and 418 pp. Maps, ills., index. A. Dewit, Brussels, 1914. Fr. 5. 8 x 5½.

We have had no meteorological text-book in French since that of Angot. In this new volume, rather more attention than usual is paid to the simpler physical facts and laws regarding the atmosphere, and there are numerous illustrations of physical experiments. Optical phenomena are also considered more fully than in many elementary text-books on meteorology. The book is not well adapted for teaching, because it lacks system, and there is not that effective correlation of the various elements which makes systematic instruction in meteorology so effective. Examples are drawn largely from Belgium. There are no bibliographic references. Authors are named, but their titles are not given. M. Vincent's volume will doubtless have local interest in Belgium, and as the product of the author's long and excellent service in meteorological work in Belgium it is to be welcomed. R. DEC. WARD.

Lehrbuch der Meteorologie. Von Julius Hann. Dritte, unter Mitwirkung von Prof. Dr. R. Süring, umgearbeitete Auflage. Parts 1-9. 800 pp. Maps, ills. C. H. Tauchnitz, Leipzig, 1913, 1914.

The first edition of von Hann's splendid "Lehrbuch der Meteorologie" appeared in 1901. Complete, systematic, compact, clear—the work of the acknowledged master of the science of the atmosphere—the book was universally welcomed and accepted as the standard meteorological text-book of the world. Within the short period of five years the author found time to issue a second, revised edition, about 150 pages shorter than the first. The second differed from the first chiefly in the omission of a large number of bibliographical footnotes, in the condensation of some of the subject-matter, and in the addition of references to all important new material which had been published in the interval 1901-1906.

So satisfying to meteorologists were the first two editions of this absolutely indispensable volume that probably few of us ever expected another edition. Yet others besides the reviewer must have cherished the hope that the veteran author would, in spite of his advancing years, find time to prepare still another issue which would, once more, give us the satisfying feeling that in one book

we may find reference to practically everything that we need to know about meteorology.

It is impossible to express, in any adequate way, the debt which meteorological science already owed to von Hann. But that debt has again been increased by the publication of a third edition of the "Lehrbuch." In this the general plan of the first edition has been followed, rather than that of the somewhat abridged second edition. We note again the copious and invaluable bibliographic notes which were a distinguishing characteristic of the first edition, and are now brought down to date again. We note the enlargement of the book to over 800 pages[1]; the addition of several new plates and figures; reference to all the newest developments of the science; a special chapter on the results of aërological observations by Professor Süring, as well as a revision of the chapters on clouds and on atmospheric electricity by the same writer.

Meteorologists the world over will accord this new volume the hearty welcome which it so richly deserves. To us Americans the appreciative references to the work of the late Professor A. Lawrence Rotch and of his Blue Hill Observatory, and to the researches of the United States Weather Bureau, are especially gratifying. In every sense of the word the book is a masterpiece. To Professor von Hann we extend the assurance of our very great indebtedness to him for his labor in the preparation of the new edition of his "Lehrbuch" and of our appreciation of his long-continued and faithful service in the cause of meteorology.

R. DeC. Ward.

METHODOLOGY AND TEACHING

Wealth of the World's Waste Places and Oceania. By Jewett C. Gilson. Series: Redway's Geographical Readers. xiii and 327 pp. Map, ills. Charles Scribner's Sons, New York, 1913. 60 cents. 7½ x 5.

The first part of this volume is almost unique. Its nature can best be indicated by listing the titles of the 21 chapters that constitute it: 1. The Wealth of the Arid Southwest; 2. The Grand Canyon of the Colorado; 3. Yellowstone Park; 4. Two Prehistoric Cemeteries—Giant Reptiles and Giant Trees; 5. Death Valley; 6. The Mineral Wealth of the Andes; 7. The Czar's Greater Domain; 8. The Mystic Highlands of Asia; 9. The Primal Home of the Saracen; 10. The Sahara; 11. Polar Regions—The Conquest of the Arctic; 12. Polar Regions—Antarctica; 13. Iceland, the Maid of the North; 14. Greenland; 15. Where the Two Great Oceans Meet; 16. Reclaimable Swamp Regions; 17. Strange Rock Formations—Natural Bridges; 18. Strange Rock Formations—Table Mountain of California; 19. Strange Rock Formations—Gibraltar; 20. The Baku Oil Fields; 21. The South African Diamond Fields.

These regions, the reader will note, are such as have, at one time or another, been considered worthless. However, man's needs have spurred him to devise ways for securing the treasures that such areas possess. Each chapter is thoroughly up to date and attractively written. The information is not only of value to the geographer for whom the book is intended, but also to the layman. The few historic narrations help to enliven the text.

It is unfortunate that no maps appear. In a country where school atlases are still not used, except in a few instances, authors of geographical texts should not overlook the significance of maps as vital parts of their books.

Eugene Van Cleef.

A Junior Geography of the World. By B. C. Wallis. ix and 310 pp. Maps, ills., index. Macmillan Co., New York, 1913. 75 cents. 7½ x 5.

The first part treats of the world as a whole; the second part deals with the continents in detail, including a special section on the British Isles. Necessarily, such a tremendous subject discussed within 315 frequently illustrated pages must be touched upon only at critical points; details must be very largely omitted.

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[1] The work has been issued in parts, of which there are to be ten. Nine have been received, covering 800 pages. The tenth part is doubtless delayed by the disturbed conditions abroad. We have not thought it wise to postpone this notice any longer—*The Reviewer.*

The chapters on the making of maps and on land explorations, so often omitted from elementary texts or very inadequately treated, are presented here in good teachable form.

The maps, diagrams and illustrations are good. One might, however, criticise the maps showing distribution of products for the omission of parallels of latitude and meridians of longitude. The map entitled "United States Railways and Waterways" (p. 215) should either be modified so as to show all of them or the title should be changed indicating that only the transcontinental roads and principal waterways are shown. The material contained in this volume, reworked a bit more systematically, should produce an excellent school text. EUGENE VAN CLEEF.

The Teaching of Geography in Elementary Schools. By Richard E. Dodge and Clara B. Kirchwey. vii and 248 pp. Index. Rand, McNally & Co., New York, 1913. $1. 7½ x 5.

The authors state that "this book is the outgrowth of a number of years experience in helping prepare teachers for work in elementary schools, or for positions as critic teachers in normal schools," and that all suggestions are based on data which have been rigorously tested in practice.

The subjects treated include the organization of a course of study in geography; all methods and problems in the teaching of geography in the lower, intermediate, and upper grades, and in the rural schools; the use of maps and other equipment, together with the sources from which this laboratory apparatus may be obtained; lists of valuable collateral reading, both for the teacher as well as the student; and many other important subjects. The book is very practical and should be in the hands of teachers of geography. WILBUR GREELEY BURROUGHS.

Physical Geography Manual. A Loose Leaf System of Fifty Simple Laboratory Exercises for High Schools and Academies. By N. A. Bengston. 129 pp. Maps. W. M. Welch Mfg. Co., Chicago, Ill. $1.45. 10 x 8.

This is a worthy addition to an increasing list of such aids to study. In addition to his university work the author is a teacher of much experience in normal and high schools. The exercises are about fifty in number and are planned for young pupils in the high school. The materials needed are inexpensive and easily obtained, and, if desired, can be had in sets from the publishers of the manual. Most of the individual exercises can be accomplished in periods of forty-five minutes, although double periods are advised.

The questions and directions are well put. The manual is relatively full on minerals and rocks, and is especially so on the atmosphere, this topic having eighteen exercises. Topographic maps are allotted but twelve exercises, but these are well selected, and to a limited extent are especially adapted to the plains of the middle West. Four field outlines are included—on weathering, surface run-off, a small stream, and soils. Coordinate and tracing papers and several weather maps are found with the manual. A. P. BRIGHAM.

GENERAL

A View of the Art of Colonization, in Letters between a Statesman and a Colonist. By E. G. Wakefield. With an introduction by J. Collier. xxiv and 510 pp. Oxford Univ. Press (Amer. Branch), New York, 1914. 8 x 5½.

This work was first published in 1849. In its day it profoundly influenced British colonial policy. If the view of the writer of the introduction of this present edition is correct, that all British colonies have either outgrown the system of Wakefield or belong to a different order, the book is of only academic interest to the political economist. The cardinal point of the theory is the opening up of unoccupied land by the government to new settlers. The system opposes the free grant of such land to immigrants and favors the sale of it to them at a "sufficient price." This "sufficient price" is one which under local conditions and circumstances will prevent the laborer from becoming a land

owner too soon. It is held that this "sufficient price" will be determined by the rate of increase of population in the place, the rate of wages there, the cost of living, and the soil and climate of the colony. It claims strangely that cheapness of land produces slavery, which really arises from the oppression of a conquered people by a superior conquering race.

The Puritans of New England were not, as Wakefield states, largely drawn from the nobility and gentry. They were mainly farmers and tradesmen. The reasoning of the work is a good example of the argumentation of the economic doctrinaire. DAVID H. BUEL.

Are the Planets Inhabited? By E. Walter Maunder. Harper's Library of Living Thought. 166 pp. Index. Harper & Brothers, New York, 1913. 7 x 4½.

A concise handbook. Two points call for note. In one chapter the author discusses the problem of Mars and reaches conclusions which quite contravene the results of Percival Lowell's research. The greater point is that Professor Maunder establishes in terse statement the conditions under which life can exist upon any planetary body. Predicating the existence of a single sun at the center of any system there must be a nice adjustment of rotation and revolution periods of the satellite, of weight and mass, but the prime condition of the problem is the existence of water in a fluid state as the sole condition of life, that is water between its two critical points of freezing and of boiling. His conclusion is that the number of habitable worlds in the universe must be very small and that the possibility of life thereon is very slight indeed.

OTHER BOOKS RECEIVED

These notes do not preclude more extended reference later

EUROPE

AARDRIJKSKUNDIG WOORDENBOEK VAN NEDERLAND. Samengesteld door M. Pott. 2nd edit. 537 pp. J. B. Wolter, Groningen, 1913. Fl. 3.90. 8 x 5½.

DIE RIVIERA. Von A. Voigt. (Junk's Natur-Führer.) 466 pp. Map, ills., index. W. Junk, Berlin, 1914. Mk. 7. 6½ x 4½.

WORLD AND PARTS OF IT

BRITAIN IN THE TROPICS 1527-1910. By A. W. Tilby. (English People Overseas, Vol. 4.) 452 pp. Constable & Co., London, 1912. 6s. 8½ x 6.

GRAND GIBIER ET TERRES INCONNUES. By M. de Bary. 341 pp. Map, ills. 2nd edit. Plon-Nourrit et Cie., Paris, 1910. 9 x 6.

LICHTENLIJST VAN NEDERLANDSCH OOST- EN WEST-INDIË. Uitgegeven door het Ministerie van Marine, Afdeel. Hydrographie. 80 pp. Index. The Hague, 1914. 9 x 6.

MANUALE COLONIALE. Di P. Revelli. 240 pp. Maps. U. Hoepli, Milan, 1914. L. 3.50. 6 x 4.

MEXICO AND PERU, AMERICA, CANADA. By C. Richmond. (World Literature Readers.) 276 pp. Ills., index. Ginn & Co., Boston, 1913. 45 cents. 7½ x 5.

THE RAILWAYS OF SOUTH AND CENTRAL AMERICA. A manual containing statistics and other information concerning the important railways of South and Central America, Mexico and the West Indies. 183 pp. Maps. F. E. Fitch, Inc., New York, 1914. $1.50. 8½ x 6.

DE TROPISCHE NATUUR IN SCHETSEN EN KLEUREN. Door A. H. Blaauw. xi and 185 pp. Maps, ills., index. Koloniaal Inst., Amsterdam, 1913. Fl. 4. 9½ x 6½.

DIE WELT DES ISLAMS. 257 pp. *Zeitschr. der Deutschen Gesell. für Islamkunde,* Herausgegeben von Georg Kampffmeyer. Vol. 1, No. 1. D. Reimer (E. Vohsen), Berlin, 1913. Mk. 12. 9½ x 6½.

ANTHROPOGEOGRAPHY

KINSHIP AND SOCIAL ORGANISATION. By W. H. R. Rivers. 96 pp. Index. School of Economics & Political Science, London, 1914. 2s. 6d. 8½ x 5½.

THE ORIGIN OF PROPERTY AND THE FORMATION OF THE VILLAGE COMMUNITY. A course of lectures delivered at the London School of Economics. By J. St. Lewinski. 71 pp. Plans. School of Economics & Political Science, London, 1913. 2s. 6d. 8½ x 5½.

THE WANDERINGS OF PEOPLES. By A. C. Haddon. vii and 124 pp. Maps, index. G. P. Putnam's Sons, 1912. 40 cents. 6½ x 5.

HISTORICAL GEOGRAPHY

GESCHICHTE DER EUROPÄISCHEN KOLONISATION SEIT DER ENTDECKUNG AMERIKAS. Von G. Roloff. 248 pp. E. Salzer, Heilbronn, 1913. Mk. 3. 9 x 6.

TROY, A STUDY IN HOMERIC GEOGRAPHY. By W. Leaf. xvi and 406 pp. Maps, ills., index. Macmillan & Co., London, 1912. 12s. 9 x 6.

TOORTSE DER ZEE-VAERT DOOR DIERICK RUITERS (1623). Samuels Brun's Schiffarten (1624). Uitgegeven door S. P. l'Honoré Naber. vi and 112 pp. Map, index. Linschoten Vereen.; M. Nijhoff, The Hague, 1913. 10 x 6½.

GEOMORPHOLOGY

DAS EISZEITALTER. Von E. Werth. (Sammlung Göschen.) 167 pp. Map, index. G. J. Göschen, Leipzig, 1909. 90 pfg. 6½ x 4½.

EIN NEU AUFGEFUNDENES KOLLEGHEFT NACH KANTS VORLESUNG ÜBER PHYSISCHE GEOGRAPHIE. Von E. Adickes. 89 pp. Univ. Tübingen Doktoren-Verzeichnis der Philosoph. Fakultät, 1907. J. C. B. Mohr, Tübingen, 1913. Mk. 2.40. 10½ x 7.

LA FORMATION DES CHARBONS ET DES PÉTROLES. Par J. Cornet. 103 pp. Reprint, *Géologie,* Vol. 3. L. Dequesne, Mons, 1913. Fr. 2.50. 10 x 6½.

THE NATURE AND ORIGIN OF FIORDS. By J. W. Gregory. xvi and 542 pp. Ills., index. John Murray, London, 1913. 9 x 6.

METHODOLOGY AND TEACHING

BLACK'S SCHOOL GEOGRAPHY. Geographical Pictures (from photographs). Edited by S. M. Nicholls. (Series: Crustal Movements.) Packet No. 1: 8 pictures. No. 2: 6 pictures. A. & C. Black, London, 1914. 6d. each. 9½ x 7.

ERDKUNDE FÜR LEHRERBILDUNGSANSTALTEN herausgegeben auf Grund der E. von Seydlitz'schen Geographie. 1. Teil: für Präparandenanstalten bearbeitet von W. Hering. 2d edit. 284 pp. Ills., index. 2. Teil: für Seminare bearbeitet von G. Lennarz. 622 pp. Maps, ills., indexes. F. Hirt, Breslau, 1912. Mk. 3.50 and Mk. 5.75. 9 x 6.

PHYTOGEOGRAPHY AND ZOOGEOGRAPHY

VORLESUNGEN ÜBER VERGLEICHENDE TIER- UND PFLANZENKUNDE zur Einführung für Lehrer, Studierende und Freunde der Naturwissenschaften. Von A. Wagner. 518 pp. Index. W. Engelmann, Leipzig, 1912. Mk. 11. 9½ x 6½.

THE WANDERINGS OF ANIMALS. By Hans Gadow. 150 pp. Maps, index. (Cambridge Manuals.) G. P. Putnam's Sons, New York, 1913. 40 cents. 6½ x 5.

GENERAL

CECIL RHODES: THE MAN AND HIS WORK. By G. le Sueur. xii and 345 pp. Ills., index. J. Murray, London, 1913. 12s. 9 x 6.

COMMODORE SIR JOHN HAYES: His Voyage and Life (1767-1831). With some account of Admiral d'Entrecasteaux's Voyage of 1792-3. By Ida Lee (Mrs. C. B. Marriott). xvi and 340 pp. Map, ills., index. Longmans, Green & Co., New York, 1912. $2.50. 9 x 6.

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NEW MAPS

EDITED BY THE ASSISTANT EDITOR

For system of listing maps see p. 75 of this volume

MAPS ISSUED BY UNITED STATES GOVERNMENT BUREAUS

U. S. GEOLOGICAL SURVEY

Topographic Sheets
(Including Combined and Special Topographic Maps)

Arizona. (a) Douglas Quadrangle. Surveyed in 1913. 1:62,500. 31°30′ - 31°15′ N.; 109°45′ - 109°30′ W. Contour interval 50 ft. Edition of Oct. 1914.
(b) Hereford Quad. Surveyed in 1912-1913. 1:125,000. 31°30′ - 31°0′ N.; 110°30′ - 110°0′ W. Interval 100 ft. Edit. of Sept. 1914.
[The southern third and two-thirds, respectively, of maps (a) and (b) are blank, as they embrace Mexican territory.]

Colorado. Axial Quad. Surveyed in 1912. 1:62,500. 40°30′ - 40°15′ N.; 108°0′ - 107°45′ W. Interval 50 ft. Edit. of Sept. 1914.

[The territory shown on this sheet has already been published, in 1910, on half the scale, as the special reconnaissance Danforth Hills quadrangle, 1:125,000.]

Idaho-Montana. Priest Lake Quad. Surveyed in 1898-99 and 1909-11. 1:250,000. 49°0′ - 48°0′ N.; 117°0′ - 116°0′ W. Interval 200 ft. Edit. of May, 1913.

[Includes the greater part of Pend Oreille Lake. Woods shown in green. The southwestern quarter has already been published, in 1901, on twice the scale, as the Sandpoint sheet, 1:125,000.]

Illinois. Baldwin Quad. Surveyed in 1912. 1:62,500. 38°15′ - 38°0′ N.; 90°0′ - 89°45′ W. Interval 20 ft. Edit. of Oct. 1914.

Michigan. Grand Rapids Quad. Surveyed in 1911-1912. 1:62,500. 43°0′ - 42°45′ N.; 85°45′ - 85°30′ W. Interval 20 ft. Edit. of Oct. 1914.

[Contains the city of Grand Rapids.]

Ohio-Kentucky. Cincinnati Quad. Surveyed in 1898. Culture revised in 1912. 1:62,500. 39°15′ - 39°0′ N.; 84°45′ - 84°15′ W. Interval 20 ft. Edit. of Sept. 1914.

[The East Cincinnati and West Cincinnati sheets printed together as one. The significance of the map was commented on under "Ohio-Kentucky," *Bull.*, Vol. 46, 1914, pp. 954-955.]

West Virginia. Sago Quad. Surveyed in 1911-12. 1:62,500. 39°0′ - 38°45′ N.; 80°15′ - 80°0′ W. Interval 50 ft. Edit. of Nov. 1914.

[Coextensive with the northeastern quarter of the old Buckhannon, W. Va., sheet, 1:125,000, last published in 1896.]

U. S. Coast and Geodetic Survey*

Alaska. Ulloa Channel to San Christoval Channel, West Coast of Prince of Wales Island. 1:40,000. 55°34.4′ - 55°20.0′ N.; 133°20.0′ - 133°4.5′ W. 1 color. Chart No. 8155. Nov. 1914. Price 30 cts.

[Part of this chart has already been published on the same scale as one of the insets on Chart No. 8262.]

Maine-New Hampshire. Portsmouth to Dover and Exeter. 1:30,000. 43°12.0′ - 42°58.7′ N.; 70°57.6′ - 70°45.7′ W. 1 color. Chart No. 229. Nov. 1914. 30 cts.

[Includes Great Bay, the lake-like expansion of the Exeter River immediately above its confluence with the Piscataqua, at whose mouth lies Portsmouth.]

Virginia. (a) Pamunkey and Mattaponi Rivers. 1:40,000. 37°49′ - 36°31′ N.; 77°13.0′ - 76°45.7′ W. 1 color. Chart No. 504. Nov. 1914. 50 cts.

(b) Southern Branch of Elizabeth River. 1:20,000. 36°51′ - 36°43′ N.; 76°20.5′ - 76°13.3′ W. 1 color. Chart No. 451. Nov. 1914. 30 cts.

[Meridional estuary debouching to the north at the city of Norfolk.]

AFRICA

Kamerun-Nigeria. Map to illustrate the paper on the Nigeria-Kamerun Boundary Commission of 1912-13 by Capt. W. V. Nugent, R.A. 1:2,000,000. 10° - 3° N.; 8° - 13° E. 14 colors. With inset, 1:24,000,000, showing location of main map. Accompanies "The Geographical Results of the Nigeria-Kamerun Boundary Demarcation Commission of 1912-13" by W. V. Nugent, *Geogr. Journ.*, Vol. 43, 1914, No. 6, pp. 630-651.

[Excellent hypsometrical map of the Nigeria-Kamerun boundary region, based on the valuable map on the same scale by Max Moisel, reviewed under "Kamerun-Togo" in the *Bull.*, Vol. 46, 1914, pp. 714-715. Practically the

*Only new charts are listed, not new editions of old charts.

same hypsometrical and bathymetrical tints are used as on the original. The title of the present map brings to mind again the unfortunate lack of distinctiveness in the titles of many of the admirable maps published in the *Geographical Journal*. Would not some such designation as that employed at the beginning of this comment better characterize the map and be more helpful to the student, whose attention may first be directed to it in a bibliography, than the stereotyped "Map to illustrate the paper . . . by"?]

ASIA

India-Turkestan. The Indo-Russian Triangulation Connection. 1:2,000,000. 37¾° - 35⅜° N.; 73⅓° - 75⅔° E. Accompanies, on p. 667, paper with same title by K. Mason, *Geogr. Journ.*, Vol. 43, 1914, No. 6, pp. 664-672.

AUSTRALASIA AND OCEANIA

Western Australia. Sketch Map to illustrate Prof. J. W. Gregory's paper on the Lake System of Westralia. 1:3,500,000. 25° - 36° S.; 115° - 124° E. 1 color. Accompanies "The Lake System of Westralia" by J. W. Gregory, *Geogr. Journ.*, Vol. 43, 1914, No. 6, pp. 656-664.

[Shows the distribution and altitude of the dry lake basins of southwestern Australia, which are interpreted as remnants of dismembered river systems, the probable course of which is shown on the map. In addition, the northern boundary of the Miocene sea and the ancient watersheds are indicated.]

EUROPE

Italy. Carta delle pioggie della Regione Veneta, Anno 1913. 1:500,000. 46°43′ - 44°50′ N.; 16°15′ - 13°55′ E. 10 colors. Accompanies "Carta annuale delle piogge [*sic*] nella regione veneta per il 1913," *Publ. N. 61, Ufficio Idrografico, R. Magistrato alle Acque*, Venice, 1914.

[Relatively large-scale map showing, in nine gradations of blue and lavender—(1) below 600 mm.; (2-8) then for every 200 mm. up to 2,000 mm.; and (9) above 2,000 mm.—the rainfall in the province of Venice during 1913.]

Italy, etc. (a) La sériculture et les marchés de cocons en Italie (par) Guido Assereto. 1:3,000,000. 46⅖° - 36½° N.; 6½° - 18½° E. 5 colors. With inset: Diffusion de la Diaspis Pentagona. 1:7,000,000. Same limits as main map. 3 colors.

(b) L'industrie de la soie en Italie (par) Guido Assereto. Same scale and coordinates as map (a). 5 colors.

(c) Filature et tissage de la soie dans d'Italie septentrionale. 1:1,500,000. 46°40′ - 43°0′ N.; 6°20′ - 14°0′ E. 4 colors. With inset: [Silk spinning and weaving in northern Lombardy]. 1:500,000. [45°55′ - 45°35′ N.; 8°50′ - 9°50′ E.] 4 colors.

Maps Nos. 5, 6 and 7, respectively, with accompanying text, of *Doc. Cartogr. de Géogr. Écon.* (Bern), 1913, No. 2.

[Map (a) shows the areas in which cocoons are produced, three grades of intensity being distinguished, and indicates the cocoon market and silk manufacturing towns and the towns which are the seat of sericultural institutes. The inset shows the regions in which measures to resist the ravages of *Diaspis pentagona* on the mulberry tree were taken by the Italian government in 1912. Map (b) shows the degree of importance of the silk industry (four degrees) in the various parts of Italy. Map (c) differentiates between the districts devoted to silk spinning and to silk weaving in northern Italy, six classes of towns being distinguished according to the importance of their silk industries.]

Switzerland, etc. Der Eisenbahnverkehr der Schweiz (von) G. Michel & C. Knapp. 1:900,000. 47°50′ - 45°40′ N.; 5°45′ - 10°25′ E. 6 colors. With inset: [Map of central Europe showing trunk railroad lines.] 1:20,000,000. 56° - 40° N.; 2° W. - 23° E. 3 colors. Map No. 4, with accompanying text (4 pp.), of *Doc. Cartogr. de Géogr. Écon.* (Bern), 1913, No. 1.

[Suggestive map showing the average daily number of passenger (five

grades) and freight trains (four grades) on the railroad lines of Switzerland. The former information is given by varying the symbol of the black line showing the railroad routes, the latter by an overprinted band of varying color. The number of passengers and freight handled by the various stations is also shown, the former by the size of the lettering designating the station's name, the latter by the symbol showing its location.]

Other Maps Received

NORTH AMERICA

United States

Alaska. Headwater regions of Copper, Tanana and White Rivers, Alaska. 1:500,000. Asa C. Baldwin, Seattle, 1914. Price $1.00.

New York, etc. The Automobile Club of America official map, covering territory within 100 miles of New York City. 4 mi.=1 in. Compiled in 1914 by the Bureau of Tours, 54th Street, New York City.

Canada

Alberta. Cereal map of Alberta, showing acreage under crop in each township in wheat, oats, barley and flax. 1:792,000. Dept. of Interior, Railway Lands Branch, Ottawa, 1914.

British Columbia. British Columbia mining divisions. 50 mi. to 1 in. Dept. of Mines, Ottawa, 1914.

British Columbia. Pre-Emptor's map. 3 mi. to 1 in. Sheets: Quesnel, North Thompson, Tête Jaune, Chilcotin, Nechako, Fort George. Dept. of Lands, Victoria, 1914.

Canada, Geological Survey. Map 92A, Coast and Islands between Queen Charlotte Sound and Burke Channel, British Columbia. 1:253,440. Dept. of Mines, Ottawa, 1913.

New Brunswick. Canada, Geological Survey. Map 61A, Tobique, Victoria County, New Brunswick. 1:125,000. Dept. of Mines, Ottawa, 1913.

Nova Scotia. Canada, Geological Survey. Map 39A, Geological map of Nova Scotia. 1:506,880. Department of Mines, Ottawa, 1911.

Saskatchewan. Cereal map of Saskatchewan, showing acreage under crop in each township in wheat, oats, barley and flax. 1:792,000. Dept. of Interior, Ottawa, 1914.

Southern Canada. Magnetic declination observed in 1910 [in southern Canada], accompanying report of Dr. Otto Klotz to the Chief Astronomer. 35 mi. to 1 in. 2 sheets. Dept. of the Interior, Astronomical Branch [Ottawa], 1911.

Western Canada. Sectional Map. 1:190,080. Sheets: 162, Seymour, B. C.; 321, Cedar Lake Sheet; 371, Cowan River; 412, Wapiti; 462, Dunvegan; 464, Giroux. [Dept. of the Interior, Ottawa, 1914.]

Sectional map [of Canada]. 1:380,160. Sheet 366, Saddle Lake. Special edition shewing lands disposed of. Department of the Interior, Ottawa [1913].

SOUTH AMERICA

South America. Stanford's library map of South America. 1:5,274,720. Edward Stanford, Ltd., London, 1914.

Abyssinia Pianta di Addis Abeba. 1:25,000. Istituto Geografico Militare [Rome], 1912.

Abyssinia–Italian Somaliland. Missione per la frontiera Italo-Etiopica. 1:500,000. Sheets Nos. 99-a to 99-f. Istituto Geografico Militare [Rome], 1911.

Missione par la frontiera Italo-Etiopica. 1:100,000. Sheets Nos. 98-a and 98-b. Istituto Geografico Militare [Rome], 1912.

AFRICA

Africa. Stanford's library map of Africa. 1:5,977,382 [*sic*]. Edward Stanford, Ltd., London, 1914.

Gold Coast. Gold Coast. 1:125,000. [23 sheets]. Director of Surveys [Accra], 1907-08.

Italian Somaliland. Somalia Italiana, Pozzi esistenti nel territorio Galgial. 1:1,000,000. Ministero delle Colonie [Rome], 1914.

Libya. Schizzo altimetrico dei dintorni di Giado-Fassato. 1:25,000. Ministero delle Colonie [Rome], 1914.

Homs e dintorni. 1:50,000. Ministero delle Colonie [Rome], 1914.

Dintorni di Tagiura. 1:25,000. Ministero delle Colonie [Rome], 1914.

Dintorni di Zanzur, 1:50,000. Ministero delle Colonie [Rome], 1914.

Nigeria. Africa. 1:125,000. Sheet North B31/DIII, Abehokuta (Southern Nigeria) [1912]; North B31/DII, Oyo (Southern Nigeria) [1913]. The Director of Surveys, Lagos.

Orange Free State. Orange Free State, Vrede District. 1:125,000. Geogr. Sec. Gen. Staff, War Office, London, 1914.

South Africa. Standard railway map of South Africa. 1:3,500,000. The Surveyor General, Pretoria, 1914.

Transvaal. Africa. 1:125,000. Sheet South G35/P-II, Transvaal, Krugersdorp. War Office, London, 1914.

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China. Yün-Nan. 1:1,000,000. Survey of India, Calcutta, 1905. Price 2 rupees 8 annas.

India. India, showing density of population. 1:5,000,000. Survey of India, Calcutta, 1887.

The Nikobar Islands. 5 mi. to 1 in. Inset: Nankauri Harbor, ½ mi. to 1 in. Survey of India, Trigonometrical Branch, Dehra Dun, 1887.

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Turkey in Asia. Carte de la Terre Sainte (Palestine moderne). 1:500,000. Inset: Plan de Jérusalem, 1:10,000. Supplément au journal *Les Missions Catholiques*, 1914.

AUSTRALASIA AND OCEANIA

New Zealand. Tramway system of Greater Wellington and the adjoining boroughs of Karori and Miramar. 16 chains to 1 inch. [The City Engineer, Wellington, 1913.]

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Balkan Peninsula. Map of the Balkan Peninsula. 1:2,000,000. G. W. Bacon & Co., London [1914].

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WORLD AND LARGER PARTS

Latin America, etc. Central America, the West Indies, South America and portions of the United States and Mexico. 1 in. to 126.46 mi. Inset: South America, 1 in. to 900 mi. Published by the United Fruit Co., Boston, Mass. [1913].

Carte générale bathymétrique des océans. Feuilles: B'II; B'III; B'IV. Publiée par le Cabinet Scientifique de S.A.S. le Prince de Monaco [Paris], 1914.

[These three sheets comprise the sub-Antarctic zone of waters between 47° - 72° S. for three-quarters of its circumference (0° - 90° W.). For comment on this second edition of the map see under "World," *Bull.*, Vol. 46, 1914, pp. 158-159.]

ATLASES

G. De Agostini: Atlante Geografico Muto. Tipo fisico-politico a colori. 25 plates of colored maps. Istituto Geografico De Agostini, Novara, 1911 (?) 9½ x 10. L. 2.25.

Prof. Dott. G. De Agostini: Atlante Geografico Metodico. Seconda Edizione. 71 plates of colored maps. Istituto Geografico De Agostini, Novara, 1913 (?). L. 7.00. 10 x 12.

[Excellent advanced atlas with physical maps, similar in type to German school atlases.]

G. De Agostini: Atlante Geografico Muto fisico politico a colori ed albo di esercitazioni cartografiche in due fascicoli. Terza ediz. (1) Fasc. Primo: Secondo i programmi governativi per la 1a e 2a Complementare, 1a e 2a Normale, 1a e 2a Tecnica, 1a, 2a, 4a e 5a Ginnasiale e il 1o anno d'Istituto tecnico o nautico. 17 plates of colored maps. (2) Fasc. Secundo: Secondo i programmi governativi per la 3a Complementare, 3a Normale, 3a Tecnica, 3a Ginnasiale e 2a d'Istituto tecnico o nautico. 11 plates of colored maps. Ist. Geogr. De Agostini, Novara, 1913 (?). L. 1.50 and 1.00 respectively. 9½ x 10½.

[Good physical maps.]

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[Emphasis on Brazil. The "Curso Superior" also contains historical maps.]

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